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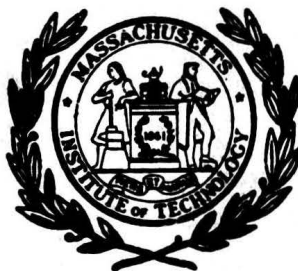
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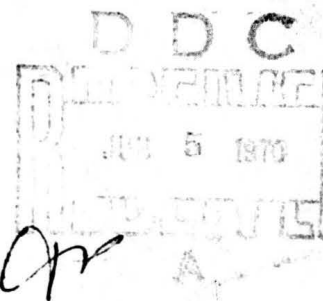
**WORLD COMBAT AIRCRAFT INVENTORIES
AND PRODUCTION: 1970-1975**
Implications for Arms Transfer Policies

by

John H. Hoagland



**ARMS CONTROL PROJECT
CENTER FOR INTERNATIONAL STUDIES
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
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(11) John H. Hoagland

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Preface

This study was commissioned as one of several major research inputs into a broad-based study of the past and future transfer of arms to the less developed countries. One of the hypotheses on which the study was based was that one of the most significant variables affecting the quantities and types of systems transferred to the less developed countries was the production of the developed countries. Furthermore, we hypothesized that there was a relationship between producer technology and the systems acquired by less developed countries. In order to test these hypotheses and to assess their implications for U.S. arms control policy, it was necessary to study trends in the military technology of the producers. Combat aircraft were selected as a case study.

This present paper is based on data collected as of January 1969. It projects for the next seven years the jet combat aircraft that will be in series production by the major producers and spells out the implications of these projections for the arms transfer process.

Mr. Hoagland is Vice President of Bolt Beranek and Newman and head of its International Studies Division. This paper represents one product prepared under sub-contract with the Massachusetts Institute of Technology. The author wishes to acknowledge the great help of Mrs. Judith O. Browne, Librarian of the International Studies Division of BBN in gathering the needed information.

This report was prepared under the sponsorship of the U.S. Arms Control and Disarmament Agency. The judgements expressed are those of the author and do not represent the official views of that agency or any other department or agency of the U.S. Government.

Amelia C. Leiss
Deputy Director
Arms Control Project

January 1970

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INTRODUCTION

The purpose of this particular paper is to forecast production programs and inventories of jet fighters and armed jet trainers throughout the world during the 1970s, in order to assess the potentials for transfer of such aircraft through export sales and military assistance. The detailed results of this research are presented in the Appendices, which comprise the main findings of this project. In Appendix A, a projection of series production of all major civil and military aircraft throughout the world is presented. Appendix A-1 deals with the year 1975; A-2 with 1970; and A-3 and A-4 with 1960 and 1950, respectively. In Appendix B, the world inventory of jet combat aircraft is presented as it may exist at the beginning of 1970. In B-1, the inventory is presented by country. In B-2, it is presented by type of aircraft, grouped according to country of manufacture.

Voluminous individual sources are not cited in the text because it has been necessary to make judgments based on sources that are often conflicting. The estimates of future production are based on a wide reading of the world's aviation and military press as collected in the files of the International Studies Division of BBN. Of particular value in estimating inventories were: International Air Forces & Military Aircraft Directory (Aviation Advisory Services, Ltd., Essex, England); The Military Balance 1968-69 (Institute for Strategic Studies, London); and Interavia selected issues of 1967 and 1968. Finally, Jane's All the World's Aircraft for all years since 1945 has been used extensively.

Three things need to be stressed. First, since these data are based exclusively on open sources, it is inevitable that they are on occasion imprecise. Although it is possible to forecast with some degree

of accuracy the types of major aircraft that will be in production and inventories, it is much more difficult, on the basis of published sources, to estimate quantities of aircraft in inventory or production. Especially in its treatment of combat aircraft inventories of the Communist nations, this presentation is subject to considerable errors. Nevertheless, the effort is made here in order to provide a working model of the world inventory, on the basis of which some general conclusions can be drawn about transfer potentials in the next decade.

Second, this report was prepared in early 1969. Many of the situations described here are highly fluid. Where major changes have occurred since completion of the study, this is noted in the text.

As a third major word of caution, it should be noted that the word "inventory" as used in this paper and Appendices is not meant to imply that all these systems are operational. No attrition rates have been used to indicate the undoubted fact that the numbers of systems actually operational are below those listed here--in some cases, substantially so.

Definitions and Restrictions. In order to provide a workable focus for the effort, several important definitions and restrictions have been drawn. The forecast deals with major military and civilian aircraft production programs during the period 1970-1975. Major aircraft are defined here as systems with a maximum takeoff weight (MTOW) over 10,000 pounds, a distinction that screens out the hundreds of different types of light utility and sports aircraft that will be in production, but that, although important in economic terms, are really not so pertinent to the question of arms transfers. An exception to the definition cited above has been made in the case of jet trainers armed for a combat role, some of which have an MTOW

slightly less than 10,000 pounds. Also omitted from the forecast is any discussion of armed helicopters.*

In both Appendices, the restrictions set forth above have been followed rigorously. Countries that are manufacturing aircraft of less than 10,000 pounds MTOW, for example, are not listed as producers. Furthermore, although civil production programs are included in Appendix B because they help to provide a more complete and accurate picture of aircraft industrial trends, the paper concentrates throughout on jet fighters and armed jet trainers and refers only to these aircraft types unless otherwise specified.

* It seems likely that direct exports as well as licenses to manufacture light helicopters will proliferate in the 1970s. As Geoffrey Kemp points out, the arming of utility aircraft and helicopters may become widespread practice in the developing countries during the 1970s. See Geoffrey Kemp, Classification of Weapons Systems and Force Designs in Less Developed Country Environments: Implications for Arms Transfer Policies, Center for International Studies, M.I.T., Pub. No. C/70-3, February 1970.

I. GENERAL TRENDS IN THE WORLD INVENTORY

By the end of 1969, the world inventory of jet-powered combat aircraft in service^{*} will consist of about 35,000-40,000 aircraft, divided approximately as follows:

Strategic bombers	2,000
Supersonic fighters	12,000
Subsonic fighters and light bombers	18,000
Subsonic armed trainers ^{**}	5,000

About 70 different types of jet combat aircraft, in the inventories of approximately 80 air forces, will comprise this total (See Appendix B). Over 40 percent of the total world inventory is probably contained in the air forces of the Soviet Union and United States; and another 15 percent in the air forces of the United Kingdom, France, and Communist China. The remaining 45 percent is divided among more than 70 nations.

With particular regard to the less developed world,[#] the inventories listed in Appendix B indicate that, of the current total of between 6,000 and 6,500 jet combat aircraft in service in the less

^{*}It is necessary to exclude here the large U.S. surplus at the Military Aircraft Storage and Disposition Center at Davis-Monthan AFB. Numbers of B-47s, F-84s, F-80s, F-101s and other combat aircraft are thus excluded from this count. No other country is judged to have a similar surplus storage arrangement.

^{**}This category must necessarily include many aircraft that are not usually used in an armed configuration but that are designed to be so used--e.g., T-33s used strictly as trainers vs. T-33s in squadron service.

[#]Defined here as countries with GNP per capita below \$500 per annum. Exceptions are Communist China, which is excluded because of its aggregate size, and Israel and South Africa, which are included because of their geopolitical setting.

developed countries, the Soviet Union is the source of over 40 percent, and the United States and Western Europe each slightly over 25 percent. The remainder are either from indigenous sources or other supplier states. Soviet jet combat aircraft are being operated in 18 countries, U.S. aircraft in 21 countries, and jet combat aircraft of Western European manufacture in 25 countries.

Of the total jet combat aircraft in the less developed world, roughly 30 percent are in South/Southeast Asia and another 30 percent in the Middle East and North Africa. Roughly 20 percent are in the Far East (excluding Communist China), 15 percent in Latin America, and 5 percent in sub-Saharan Africa.

The number of major aircraft, civilian and military, in series production throughout the world at any one time has risen steadily since World War II (see Appendix A). In 1950, there were 63 such production programs in eight countries, of which 30 were combat aircraft (eight of them powered by piston engines). By 1960, about 85 different types of major aircraft were being series-produced in 17 countries, of which 40 were military combat aircraft (all jet-powered, 15 of them supersonic).^{*} In 1970, there will be about 110 major aircraft production programs underway in 20 countries, of which 45 will be military combat aircraft (about 30 of them supersonic). By 1975, corresponding increases are likely to have occurred. At the present time, about 95 programs in 21 countries can be forecast with some degree of precision, and more are certain to be added by the mid-1970s. Roughly 45 of these will be combat aircraft production programs.

Available evidence indicates that attrition from this world inventory of jet combat aircraft is occurring at the rate of 5-10

^{*}Licensed programs such as the F-104 production in Western Germany and MiG production in Eastern Europe are counted as production programs in their own right.

Table 1

ATTRITION RATES OF SEVERAL MILITARY AIRCRAFT

<u>AIRCRAFT</u>	<u>U.K. Built</u>	<u>Total Built</u>	<u>Prod. Start</u>	<u>First Service</u>	<u>Prod. Stop</u>	<u>Est. Mid Prod. Pt.</u>	<u>No. Est. 1970</u>	<u>% of Orig.</u>	<u>Est. % Yearly Attrition</u>
Vampire	3268		1946	Mar. 1946	1954	1951	274	8.5	12.5
Canberra	935	+U.S.	1950	May 1951	1959	1956	287	33.0	7.5
Venom	840		1951	July 1952	1958	1955	215	25.0	9.0
Hunter	1525	2000	1953	June 1954	1960	1957	900	45.0	6.0

percent per year (See Table 1) or roughly 2,000 to 4,000 aircraft; and that replenishment from production lines is occurring at about 3,000 to 4,000 aircraft per year.*

Dramatic changes have occurred in the performance and characteristics of aircraft since the late 1940s. As Table 2 and Figure 1 illustrate, engine thrust and take-off weight of jet fighters have increased dramatically. These changes, along with aerodynamic refinements and the introduction of structural materials having a higher strength-to-weight ratio, have permitted continuing improvements in performance--in terms of range, payload, speed, versatility, and avionics capacity affecting navigation and fire control in reduced visibility conditions.

The subsonic fighters of 1950 vintage, such as the DeHavilland Vampire, Dassault Ouragan, Republic F-84, and MiG-15, typically had armaments consisting of four 20mm cannon with 150 rounds each or six machine guns. In addition, they could carry two 1,000-lb. bombs or several 500-lb. bombs and some small rockets (e.g. 127mm) under the wings. With this type of load, they could operate over a radius of about 500 miles at speeds of about Mach 0.8.

By the late 1950s, a new generation of supersonic jet fighters appeared that has been in production ever since, in successively improved versions. Examples are the Dassault Mirage III, SAAB Draken, Lockheed

*In commercial marketing studies, a replenishment rate of seven percent has been assumed. (See "Analysis of Potential World Market for the Helio Twin Stallion," Browne and Shaw Research Corporation, for Helio Aircraft Corporation, 1966.) This would indicate replenishment of 2,450-2,800 per year. However, by examining each of 45 possible combat aircraft production programs for 1970 as listed in Appendix A-2 and assigning probable rates of production to them, a figure of 4,000 is derived. Therefore, a range of 3,000-4,000 is assumed here as a logical assumption for planning.

Table 2

JET FIGHTERS -- 1950

<u>Fighter</u>	<u>MTOW</u>	<u>Thrust</u>	<u>MTOW:Thrust</u>
Vampire	12,170	5,000	2.43:1
Ouragan	12,350	5,000	2.47:1
Attacker	11,500	5,000	2.30:1
Banshee	17,000	6,250	2.89:1
Fury	12,697	4,000	3.15:1
Sabre	20,000	5,000	4.00:1
Scorpion	32,000	10,000	3.02:1
F-84	30,000	5,000	4.00:1

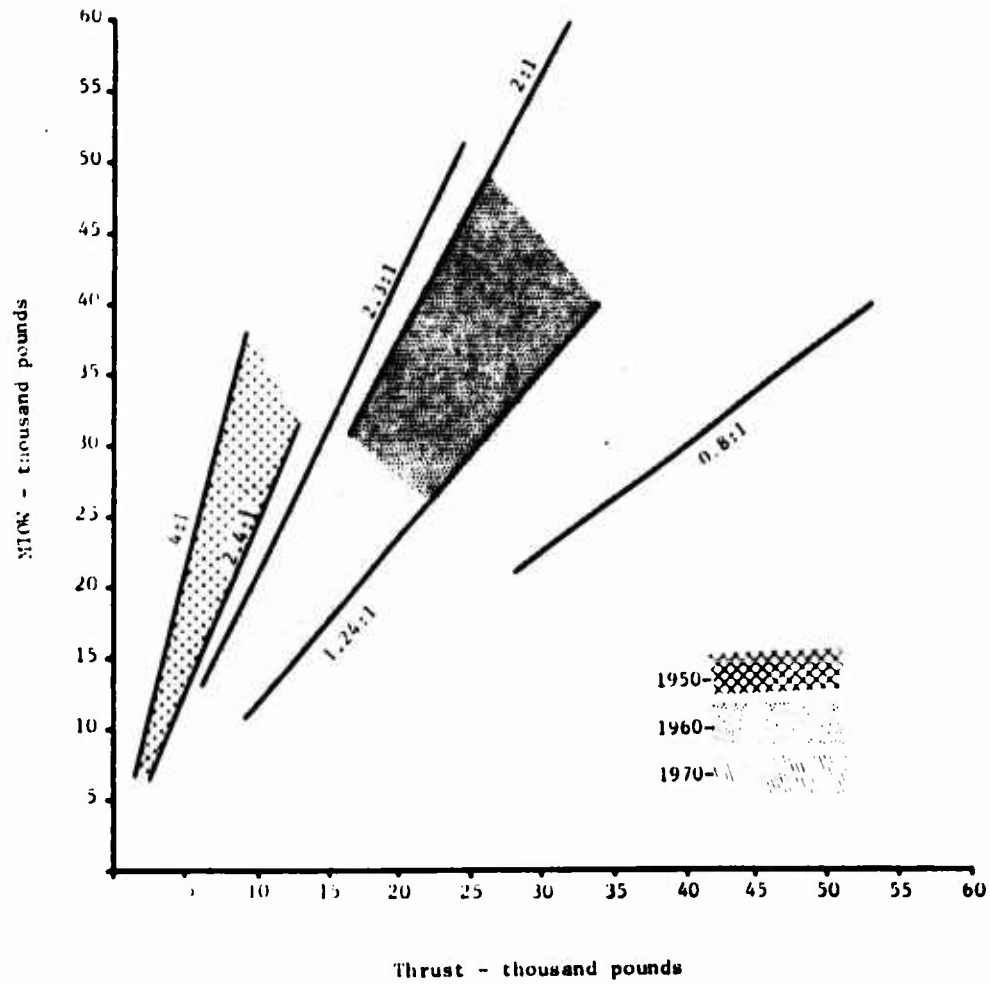
1960

Austr. Sabre	17,300	7,500	2.31:1
Etendard IV	23,000	14,110	1.63:1
Mirage III	20,000	14,110	1.42:1
F-104	28,000	15,800	1.77:1
G 91	11,700	5,000	2.34:1
Draken	19,800	15,200	1.30:1
Hunter	20,000	14,000	1.43:1
Crusader	27,000	16,000	1.70:1
F-106	35,000	24,500	1.43:1
A4D	17,295	7,700	2.25:1
Phantom	40,000	32,300	1.24:1
F-105	48,400	26,500	1.80:1

1975

Mirage F	32,360	16,000 (est)	2:1
Mirage G-4	60,000	32,000 (est)	1.87:1
F-15	40,000	50,000	.80:1
F-14	50,000 (est)	50,000	1:1

Figure 1
MAXIMUM TAKEOFF WEIGHT AND TOTAL THRUST
OF JET FIGHTERS, 1950-1975



F-104, Republic F-105, McDonnell-Douglas F-4, and MiG-21. Some of these aircraft are capable of carrying combat loads as much as four times greater than the aircraft of the previous decade, over a combat radius of up to 1,000 miles (depending on the payload weight), with supersonic speed available intermittently during the mission. For the largest of this generation of aircraft, the F-4 and F-105, weapons loads well in excess of 10,000 pounds can be stored externally. Some typical range-payload curves of this generation are shown in Figures 2 and 3.

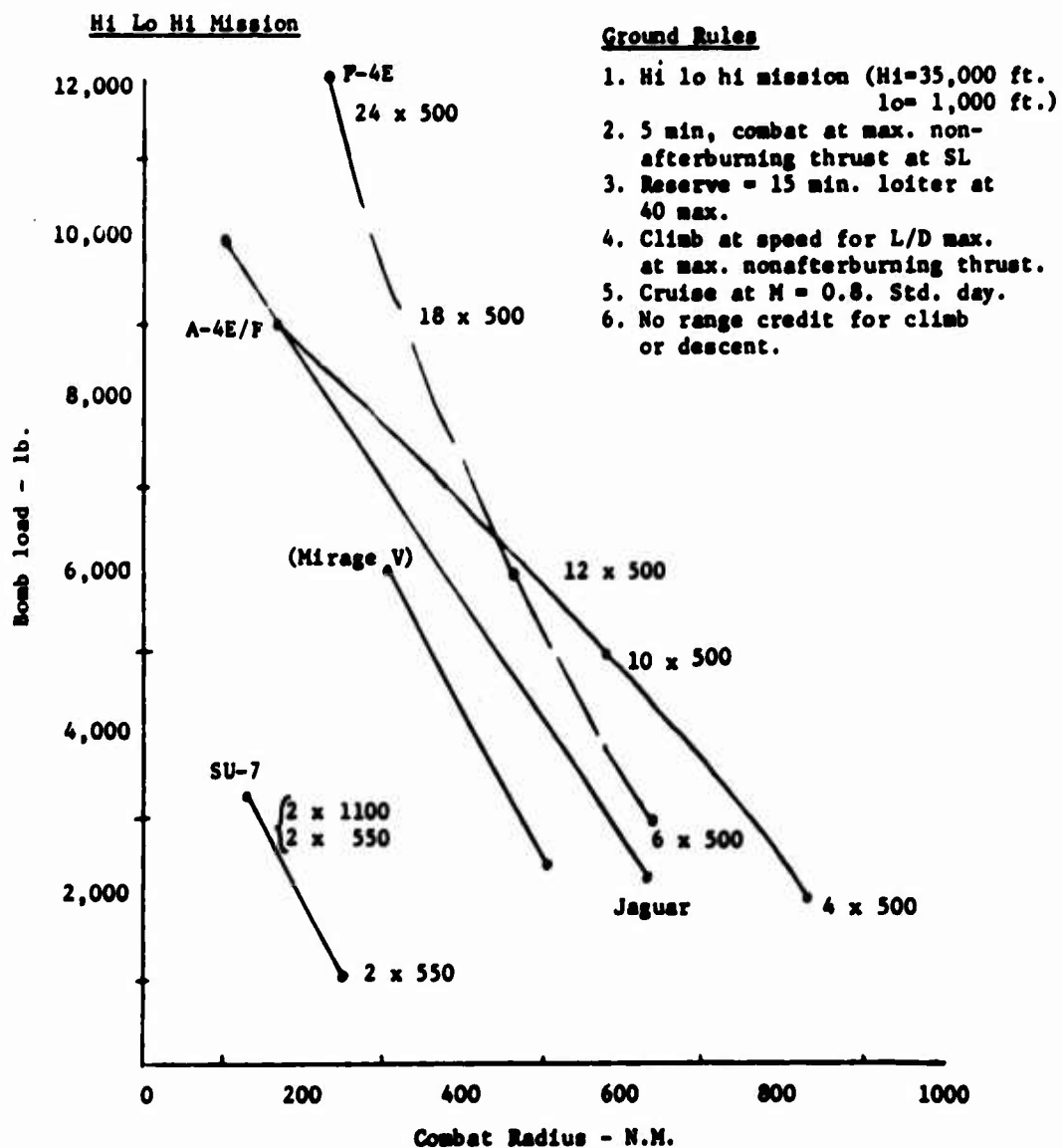
By the mid-1970s, a new generation of jet fighters will appear, such as the U.S. Grumman F-14 variable-geometry naval strike aircraft, the USAF F-15 air superiority fighter, the Anglo-German MRCA-75 variable-geometry fighter, Dassault Mirage G-4 variable-geometry strike fighter, and several Soviet fighters including FOXBAT Mach 3 interceptor, FLAGON twin-engine long-range fighter, FAITHLESS STOL fighter, and FLOGGER variable-geometry strike fighter.* Specific characterizations are difficult because of the wide variety of missions required of these aircraft. However, even though defense planners are stressing single-mission capability in most of the new aircraft (e.g. air superiority being the exclusive requirement for the F-15), it seems likely that improvements in powerplant thrust-to-weight ratios, materials strength-to-weight ratios, and in airfoil shapes, will make these aircraft just as versatile, on a higher technological plateau, as the McDonnell-Douglas F-4 has been. As discussed later in this report, their unit cost will be vastly increased over earlier aircraft--running as high as \$10 million per unit.

*Of the various new Soviet aircraft shown at the 1967 Domodedovo display, these are selected here as the most likely to be in series production in the early 1970s.

Figure 2

PERFORMANCE CURVES FOR FIVE COMBAT AIRCRAFT:

HI LO HI MISSION

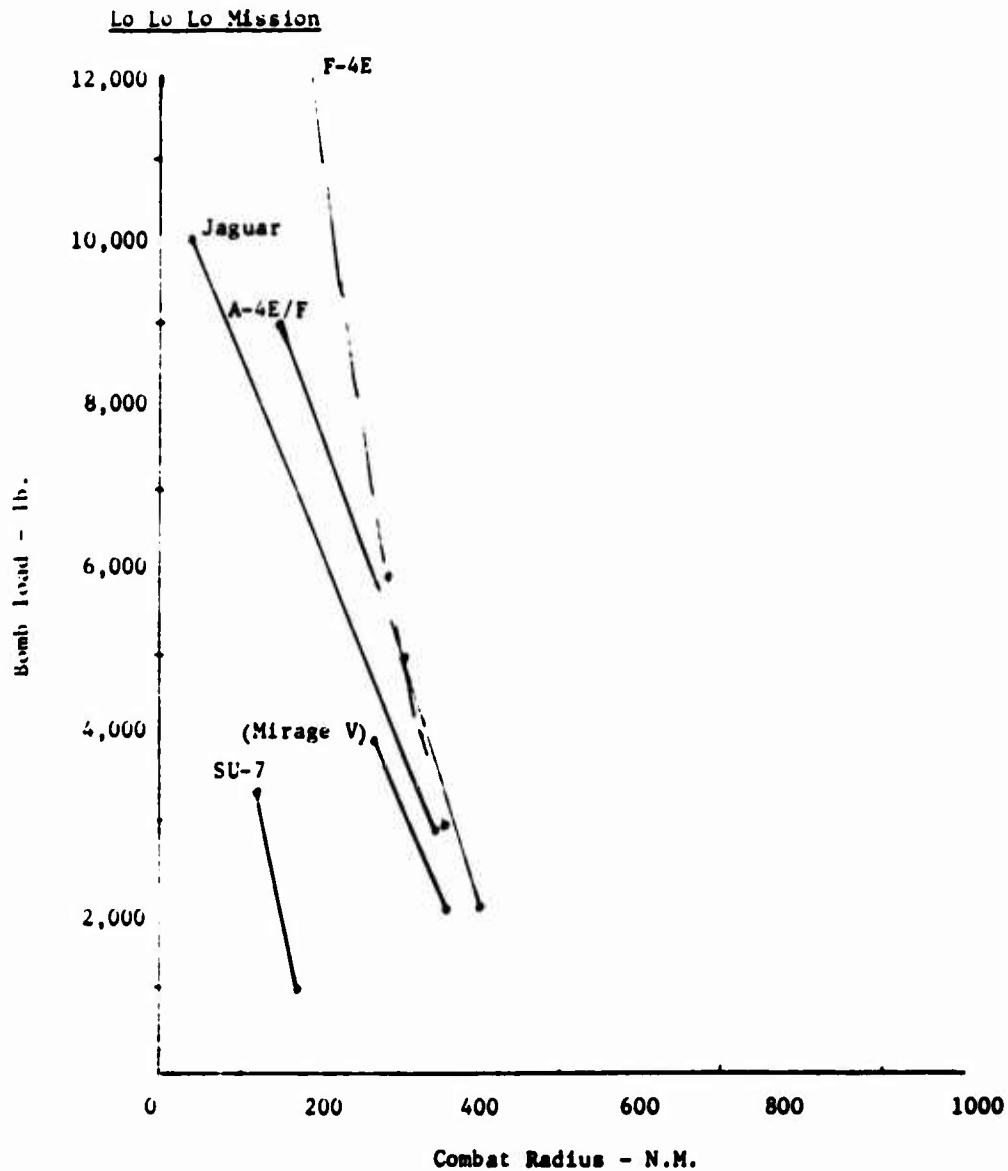


The calculations for all systems, except the Jaguar, were prepared by Professor Norman Han and Mr. Michael Scully of the Department of Aeronautics and Astronautics, Massachusetts Institute of Technology.

Figure 3

PERFORMANCE CURVES FOR FIVE COMBAT AIRCRAFT:

LO LO LO MISSION



See Figure 2 for Ground Rules and Weapons Loads.

The calculations for all systems, except the Jaguar, were prepared by Professor Norman Ham and Mr. Michael Scully of the Department of Aeronautics and Astronautics, Massachusetts Institute of Technology.

II. THE MAJOR SUPPLIERS IN THE 1970s.

The possible major production programs of 21 countries in the early 1970s are tabulated in Appendix A. Based on that tabulation, general combat aircraft production trends in many of those countries are discussed in this section in order to shed some light on both the capabilities and motivations that may influence their policy toward exports to the developing countries in the 1970s.

The United States and Soviet Union are, in absolute terms, by far the largest of the world's manufacturers (See Table 3). In terms of exports to the less developed world, however, the urgent need for export sales of the aircraft industries of other nations will continue to make them very competitive in less developed country markets.

A. The United States.

In aircraft production, as in many other industrial fields, the United States is the world giant. As the data in Appendix A clearly illustrate, the United States has been the world leader in civil and military aircraft production since World War II and is likely to retain that position until the end of the century.

Production of U.S. combat aircraft has typically been characterized by rates of ten up to as high as 50 per month and total runs ranging from 500 up to 2,000 are typical of the principal types of combat aircraft. In the past decade, about ten different types of combat aircraft have been in production at any given time. Although specific estimates based on published data can be taken only as general guides subject to gross error, it seems likely that the United States will produce annually, in the early 1970s, over one third of the world total units of jet combat aircraft.* Foreign licensed

*Based on Appendix A-1, assigning estimated production rates to all the combat aircraft listed.

Table 3

AEROSPACE INDUSTRY COMPARISON -- 1968^a

	<u>Aerospace Workforce (thousands of workers)</u>	<u>Total Aerospace Sales (\$ million)</u>	<u>Aerospace Export Sales (\$ million)</u>
United States	1,200	30,000	3,000
Soviet Union	---	---	---
France	100	1,500	500 (roughly 80% military)
United Kingdom	240	1,100	700
Canada	48	800	500
Germany	38	260	30.5
Japan	21	250	40
Italy	22	150	54
Sweden	15	---	---

^aBoth the space and civil aircraft increments of the U.S. industry are proportionally much larger than in the other countries listed. In terms of jet combat aircraft production only, if complete figures were available they would probably indicate that the discrepancies between countries are probably not nearly so great as this table shows. On the basis of programs shown in Appendix A-1, and assigning rough estimates of annual rates for each program, it might be assumed that, in the early 1970s, the United States and Soviet Union will each produce about 30 percent of all jet combat aircraft units produced, Western Europe and Canada about 25 percent, and a dozen additional countries about 15 percent.

production has also been established in several instances. As Appendix B-2 indicates, the largest U.S. transfers, either by direct export or production licenses, have been in six aircraft:

The Lockheed F-104 supersonic fighter, about 1,700 of which will have been exported to or licensed produced by allied industrial nations in Western Europe and Japan by the early 1970s.

The Northrop F-5 light supersonic fighter, about 700 of which are in inventories or on order from U.S. and licensed production lines in Canada and Spain. About two thirds of this total have been allocated to allied industrial nations such as Canada, Spain, the Netherlands, Norway, Greece, and Turkey, with the other one third going to developing countries such as South Korea, Nationalist China, Philippines, Thailand, Iran, and Morocco.

The McDonnell-Douglas F-4 supersonic fighter, which, in addition to a very large current U.S. inventory and order backlog, is on order in Britain, West Germany, and Japan (in the last case through licensed production) as well as Israel and Iran. Current inventories and orders outside the U.S. total about 400 aircraft.

The North American F-86 subsonic fighter, of which there are still about 2,000, divided evenly between treaty allies in the industrial and less developed countries (some of the less developed countries' inventories resulting from secondary transfers from major U.S. allies such as West Germany).

The Republic F-84 subsonic fighter, of which there are about 1,000 aircraft, largely in the hands of U.S. NATO allies (and all nearing retirement).

The Lockheed T-33 trainer, about 500 of which are in the inventories of allied nations such as Canada, France, West Germany, and the Netherlands, with an additional 150 to 200 in the less developed countries, largely in Latin America.

The six aircraft listed above comprise over 90 percent of all U.S. jet combat aircraft and armed trainers currently in world inventories outside the United States. In the 1950s, the F-84 and F-86 were the main export fighters. In the 1960s, the F-104, F-5, and more recently the F-4 have been the most numerous. Other U.S. combat aircraft that have been exported in modest numbers are the F-100 (France, Denmark, Turkey, Nationalist China), the F-101 (Canada, Nationalist China), and the A-4 (Argentina, Australia, Israel).*

It is also clear, from the distribution of U.S. jet combat aircraft currently in inventories or on order outside the United States, that the vast predominance of U.S. exports and licenses of such aircraft (about 76 percent) are in the hands of NATO allies or other industrial nations and that the remaining 24 percent (roughly 1,700 aircraft) in the less developed world have gone largely to treaty allies on the Sino-Soviet periphery and to Latin America.

In the first half of the 1970s, the most obvious potential U.S. export aircraft are the F-4, F-5, A-4, A-7, and A-37.** The F-4

*Numerical totals are provided in Appendix B-2.

**The emphasis of this paper has been placed on export potentials, not the political will to do so. The United States in mid-1969 is evidencing great caution with regard to jet fighter inputs to the developing world.

is the most renowned of all fighters currently in production. The large-scale purchases by the U.S. Air Force and Navy, and the recent decisions of Britain, West Germany, and Japan to buy or build it, have all increased its reputation. Through transfer to Israel and Iran, it has now entered the less developed world, where its combination of high payload, range, speed, and versatility make it extremely desirable to military planners. The obvious constraints against its widespread transfer are: its extremely long range and high payload, making its introduction politically volatile; and its high cost in relation to other available supersonic fighters (about \$5-6 million compared with \$1-2 million for the Mirage V or F-5).

The Northrop F-5, with less than half the take-off weight of the F-4, is a light and relatively inexpensive supersonic fighter designed especially for the export market. Northrop's recent success in obtaining U.S. funding to develop the uprated (and more expensive) F-5-21 version may extend production of the aircraft to about 1973 if, as the manufacturer claims, the modifications will make it comparable to the MiG-21 in performance. The main purpose of the uprating is to give the F-5 an air superiority role in opposition to later versions of the MiG-21. A strenuous export sales effort seems likely, especially in competition with other aircraft in the \$1-2 million price range such as Mirage III and Jaguar.

The McDonnell-Douglas A-4, although subsonic, has a higher range-payload capability* than most combat aircraft in the 25,000 pound weight category. Its success in U.S. service as well as its exports to Argentina, Australia, and Israel, point to the possibility that there will be a further demand for the aircraft. Furthermore,

*As Geoffrey Kemp's study illustrates, for most strike missions, payload is regarded by professionals as the most important performance parameter. Since most of the current supersonic aircraft operate usually in the Mach 0.8 to Mach 1.2 region, the high subsonic performance of the A-4 is not too serious a drawback in any but the most heavily defended environments (See Kemp, op. cit.)

along with the VTOL BAC Harrier and Fiat G-91Y, it is one of the very few subsonic fighters still in production above the armed trainer class. Its price, which is probably somewhat less than \$1 million, makes it extremely competitive as a strike aircraft in environments where air superiority is not the most important factor, or where other aircraft provide that capability.

In the armed trainer category, the only current U.S. entry is the Cessna A-37B, which has been used by the U.S. Air Force in Vietnam and will probably be supplied to the South Vietnamese Air Force. This aircraft has very impressive characteristics for the permissive COIN environment particularly range and payload in comparison with its simplicity and relatively low cost.

New U.S. combat aircraft that may become available for export in the 1970s are the Grumman F-14 naval air superiority and interdiction fighter, the F-15 air superiority fighter for USAF, and the AX twin-turboprop COIN fighter. The F-14, which will be developed starting in 1973, will be a relatively heavy aircraft, with a take-off weight on the order of 55,000 pounds (roughly the same as the F-4). It will be a variable-geometry aircraft capable of sustained speed in excess of Mach 2. Although it might look very attractive to other nations as a strike aircraft, the probable unit price of about \$8-10 million, as well as security classification of some of its systems, will probably inhibit widespread export in the 1970s.

The F-15 will be a somewhat lighter, more maneuverable aircraft capable of supersonic air-to-air combat. It will have a fixed wing, an MTOW on the order of 40,000 pounds, and less range and payload than the F-14. Its primary mission will be air superiority. Deliveries to USAF are likely to begin by 1975, and it is conceivable that the F-15 and F-14 will be the major U.S. combat aircraft production programs until well into the 1980s, a fact that in itself suggests that they will sooner or later be exported fairly widely. The F-15 has been suggested for export to West Germany and other members of the

"F-104 Club" in the later 1970s as an alternative to indigenous European programs.

The AX, still essentially an Air Force design study, calls for a light twin-turboprop COIN aircraft for use as a close-support fighter for ground attack in a relatively permissive environment. Such an aircraft might be available for export by about 1975.

It is very difficult to make judgments about jet combat aircraft that the United States might be able to export out of surplus stocks in the 1970s. The U.S. inventory in Appendix B-1 indicates possible large numbers of F-4s, A-4s, and F-100s, all of which would be feasible as export aircraft. Others, in spite of their potentially large numbers, might be far less suitable -- e.g. the F-102 and F-8 -- because of their specialized roles or characteristics.

B. Soviet Union.

Of all the principal manufacturing nations, the Soviet aircraft industry has achieved the most dramatic improvement since World War II. As Appendix A illustrates, the Soviet industry in 1950 was producing only a few types of aircraft. These were the MiG-15 and MiG-17 fighters, the Il-28 light bomber, the Tu-4 copy of the B-29, and the Il-12 twin-engine piston transport. After Stalin's death, the resurgence of activity in the military and technological sectors brought with it a new generation of heavy and medium jet bombers (Tu-95, Mya-4, Tu-16), supersonic fighters (MiG-21 and Su-7), and an enormous effort to build up civil aviation by producing civil transport versions of large military aircraft (An-12, Tu-104, Tu-114). All of this activity became evident in the second half of the 1950s. In the 1960s, Soviet civil air transport, both domestic and international, has burgeoned, and with it the Soviet industry has begun to produce a much wider variety of civil transports. Although these are not yet

competitive with U.S. or British transports on the world market because of less favorable weight-to-payload ratios, engine overhaul times, and direct operating costs, they have been built in large quantities for Soviet service and provide evidence of rapid improvement in the Soviet industry. The Antonov, Beriev, Ilyushin, Tupolev, and Yakovlev bureaus have designed many different types of light, medium, and heavy turbine-powered transports, including the Tu-144 supersonic transport, that are currently in production.

In military production, the Domodedovo display of 1967 provided public evidence of a heavy continuing investment in combat aircraft--especially high-speed interceptors but also a variety of strike aircraft. Based on the Soviet aircraft listed in Appendix A-1, it seems likely that the Soviet industry will, like the United States, produce a third or more of all jet combat aircraft units produced annually in the early 1970s (Based on rough guesses of production rates for each type). A new generation of Mikoyan, Sukhoi, and Yakovlev aircraft appears to have been developed several years ahead of the comparable U.S. generation represented by the F-14 and F-15. The fighter designated FOXBAT in the NATO system, probably developed by Mikoyan, is a Mach 3 fighter that may be in operational service by 1970. The different types of new combat aircraft listed in Appendix A-1 include a variety of STOL and variable-geometry fighters for interceptor and strike missions. It seems unlikely that any of these new aircraft such as FOXBAT or FLAGON will be exported outside the Warsaw Pact in the early 1970s, but their introduction into the Soviet inventory will probably assure the continued availability of MiG-21s and Su-7s for export. The Su-7 appears to have an especially strong export potential as a ground support fighter.

The principal export aircraft are likely to be all of the MiG fighters (15 to 21) plus the Su-7 in the early 1970s. FOXBAT might become an export fighter to favored clients after 1975. There

is always a possibility, of course, that a highly favored client who could guarantee the physical security of the aircraft--e.g., India--might receive it before 1975.

Outside the Warsaw Pact, the most important Soviet clients will probably continue to be India, Egypt, and the other Arab states, and the Asian Communist countries. In addition, the Soviet Union has obviously developed the capability to respond quickly when "targets of opportunity" such as Nigeria develop. This growing ability to transfer equipment after hostilities have erupted is likely to be an important feature of the Soviet style in Africa and other parts of the developing world in the 1970s.

The prices of Soviet aircraft, as well as the terms of trade, appear to be flexible. The MiG-21, depending on the version, probably sells for less than \$1 million, a price that makes it very competitive with Western supersonic aircraft. Additionally, however, the Soviet Union appears to be as generous in arranging terms of trade as the conditions may demand.

Since 1955, when it initiated its program of military sales and assistance to the developing countries, the USSR has exported more than 2,700 jet fighters and light bombers to about 18 countries. (Over 1,000 have gone to the Middle East.) In general, the Soviets have adopted a standard export package consisting of progressive versions of the MiG fighter plus the Il-28 light bomber and, more recently to favored clients, the Su-7 ground-support fighter. Aside from the potential export of FOXBAT mentioned above, the only other significant addition to the Soviet export list would be the family of Yakovlev subsonic and transonic light tactical bombers: Yak-25 (FLASHLIGHT); Yak-28 (FIREBAR/BREWER); and Yak-42 (FIDDLER) (See Table 4). If FLAGON replaces the Yak-28 in the 1970s, then that aircraft in particular might have a strong export potential, especially to India and the UAR.

Finally, the Mikoyan light delta-wing STOL fighter designated

Table 4

ESTIMATED SOVIET INVENTORY OF COMBAT AIRCRAFT, 1969^a

	<u>Tactical</u>	<u>Air Defense</u>	<u>Strategic</u>	<u>Naval</u>
MiG-15 (Fagot)	X			
MiG-17 (Fresco)	X	X		
MiG-19 (Farmer)	X	X		
MiG-21 (Fishbed)	X	X		
SU-7 (Fitter)	X			
SU-9 (Fishpot)		X		
Yak-25 (Flashlight)	X			
Yak-28 (Firebar/Brewer)	X			
Yak-42 (Fiddler)	X	X		
Il-28 (Beagle)	700-800			50-150
Tu-16 (Badger)			600-700	300-400
Tu-95 (Bear)			70-90 ^b	50
Tu-22 (Blinder)			100-150	50-100
Mya-4 (Bison)			100-120 ^b	
TOTALS	4000	3700-4000	900	700

^aThis list does not include types seen since 1967 which are now entering the inventory. The most important probably are: Foxbat Mach 3 interceptor; Flogger (MiG) VG fighter; Flagon A and B (Sukhoi) fighter and STOL fighter; and Faithless delta-wing MiG fighter.

^bDifferences between this and U.S. official published estimates are due primarily to the fact that many of the total aircraft listed here are intended either as tankers or for missions other than attack on U.S.

FAITHLESS, and the FLOGGER variable-geometry strike fighter, are both obvious candidates for export by the mid-1970s.

C. Western Europe and Canada

Before dealing separately with Canada and the countries of Western Europe, it may be useful first to make several observations that are generally applicable to the region as a whole. First, the aircraft industries of Western Europe have exerted and will continue to exercise an influence on jet combat aircraft export markets that exceeds their absolute size in relation to the U.S. and Soviet industries.

Britain and France must normally export well over half their aircraft production in order to attain production runs long enough to keep unit costs at an acceptable level. Furthermore, the absorptive capacity of the less developed countries is well matched to the output of the British and French industries, in the sense that typical orders from the developing countries are not so large as to overtax the capacity of the British and French industries; and on the other hand, the market as a whole is sufficiently large to justify an active and continuing sales organization.

A key conclusion about Western Europe as a supplier in the 1970s is that, in order to survive, the various industries (especially Britain, France, and Canada) must export a combined total of several hundred jet fighter and armed trainers per year. In the 1970s, the industries of Western Europe and Canada may account for up to 25 percent of all jet combat aircraft units produced annually, based on rough judgments derived from Appendix A-1.

As subsequent discussion will indicate, the British aircraft industry in particular will be waging an aggressive sales campaign in the less developed world in the early 1970s. Partly because of this

campaign, the option to purchase high-performance jet fighters such as Lightning and Jaguar will be open to many less developed countries, a factor that will tend to force all the potential suppliers to make new aircraft available to the less developed world direct from production lines.

1. The United Kingdom. Since its crisis of the mid-1960s, when several major military programs were cancelled and the select Plowden Committee took an essentially hostile view in its inquiry,^{*} the British aircraft industry has made a vigorous comeback. Although it appears headed for another crisis in the early 1970s, when several currently profitable programs will have ended, the mood of the industry is now basically optimistic.

The current policy line of the industry's management, especially that of BAC, is that dependence on British government-controlled orders for production of both civil and military aircraft must be reduced rapidly. To this end, it is no exaggeration to say that present and future military aircraft programs are being judged primarily by their export potential, with domestic orders being sought only as a guaranteed base. Thus, the Anglo-French Jaguar light supersonic fighter is being pushed very hard for export and licensed production. The French and British orders for 200 aircraft each are regarded, at least in Britain, primarily as a secure base on which to build a profitable export program.

In 1968, British aerospace sales slightly exceeded \$1 billion, of which \$700 million were exports--representing an all-time high record in British aerospace export sales. Military export sales normally represent at least half of total aerospace exports. These

^{*} Ministry of Aviation, Report of the Committee of Inquiry into the Aircraft Industry, appointed by the Ministry of Aviation under the Chairmanship of Lord Plowden: 1964-65, Cmnd. 2853 (London, HMSO, 1965).

figures illustrate the vital importance of military exports to the very existence of the British aircraft industry. They indicate why any future fighter program will be aimed primarily at the export market.

In 1970, there will be thirteen major aircraft production programs underway in four manufacturing firms. Nine of these programs are civil jet transports of many sizes, ranging from the Anglo-French Concorde SST down to the Handley Page Jet Stream executive jet. The remaining four programs are jet fighters on which Britain will mainly base its military aircraft export sales in the early 1970s. These are the BAC Lightning supersonic interceptor, the BAC-Breguet Jaguar supersonic fighter/trainer, BAC 167 armed trainer, and the Hawker Siddeley Harrier VTOL fighter. (Typical production rates for each of these aircraft are probably about five per month.) In addition, the British industry has geared itself to the refurbishing of earlier fighters--especially Hawker Hunters--that are repurchased from NATO partners and then, after modernization, sold to less developed countries.

The Lightning is a Mach 2 interceptor with an exceptionally fast rate of climb. In addition to about 140 in RAF service, the Lightning has been sold to Kuwait and Saudi Arabia in a modified ground attack version and has recently been offered to Malaysia. Its continued production will depend on further export orders.

The BAC-Breguet Jaguar is a light strike fighter, production of which has been guaranteed by the British and French orders. The aircraft is in roughly the same weight and performance category as the Northrop F-5 and Dassault Mirage V. It is heavier than the F-5, with greater range and payload, and has the advantage of two engines over the single-engine Mirage V. It should be available for export or licensed production in the early 1970s. It will sell for \$1.5 - \$2 million, somewhat higher than F-5 and Mirage V.

The BAC 167 is Britain's entry in the armed trainer market. The 167 and its trainer counterpart, the Jet Provost, have been exported to Burma, Iraq, Kuwait, Muscat and Oman, Singapore, South Yemen, and Venezuela. It will continue to compete with the Macchi MB. 326, Sud Magister, and Canadair CL-41, for sales to smaller less developed countries. The unit cost of these aircraft--usually under \$500,000--tends to offset their performance limitations.

The Harrier is the first operational VTOL fighter in the world. Its cost will be roughly the same as Jaguar, but its speed, range and payload are considerably less than conventional aircraft because of the premium paid for V/STOL capability. Nevertheless, whenever that capability is important, Harrier will have a promising market, because it has been thoroughly tested and proved prior to first deliveries. With an uprated engine to give it improved performance, U.S. orders are very likely.

By the spring of 1970, potentially the most important of all the European jet fighter programs of the 1970s--the MRCA-75--is likely to be underway. The major partners in a consortium known as Panavia will be Britain and West Germany (through BAC and Messerschmitt). The minor partners will be the Netherlands (Fokker)^{*} and Italy (Fiat). This program, if carried through to completion, will result in joint series production, starting in 1974-75, of a new supersonic strike fighter to replace the F-104 in European inventories between 1975 and 1980. There is a potential European market for about 1,200 of this type aircraft: roughly 600 for West Germany, 250 for Britain, 200 for Italy, and 100 for the Netherlands.^{*} All but the British figure correspond very closely to current F-104 inventories.

According to the present timetable, the systems definition and national decision-making phases are likely to continue to the spring of 1970, when the development program should be authorized. If it is authorized, then the first prototype should fly by early 1973,

^{*}Subsequent to this writing, the Netherlands withdrew from this consortium.

and first production deliveries to the Luftwaffe should begin in 1975. Although it is difficult to know how present differences in British and German operational requirements will be resolved, it seems likely, in general terms, that the aircraft will be a variable-geometry fighter with an MTOW in excess of 30,000 pounds, maximum speed of about Mach 2, and a combat radius of 220-250 miles. Different versions will be required to satisfy the German requirement for a close support and air superiority fighter vs. the British requirement for a more sophisticated strike and reconnaissance aircraft armed with nuclear stand-off missiles and equipped with advanced electronic systems for fire control, navigation, and all-weather capability.

The unit cost, depending on the versions, is being estimated at roughly \$3-\$5 million based on a production run of 1,000 aircraft, but the actual costs are virtually certain to run higher.

The MRCA-75 program has two strong implications for future arms transfers. The first is that its introduction will be accompanied by a phase-out of F-104s from the air forces of West Germany, the Netherlands,* and Italy. Even with attrition, as many as 500 F-104s may therefore be available for re-transfer from Western Europe after 1975. A second point is that Britain is considered, in the view of its German partners, to be interested in the MRCA-75 mainly as an export aircraft to follow its current programs. Already, in fact, there are indications of market research and preliminary inquiries regarding MRCA-75 sales in the less developed countries. After 1975, therefore, this aircraft, along with the F-14, F-15, and FOXBAT, might become the next generation of export fighters. According to current estimates, the MRCA-75 unit cost will be much lower than U.S. aircraft of the same generation.

2. France. The summary in Appendix A illustrates the French industry's heavy dependence for future orders on military aircraft and on the Concorde supersonic transport program. Aside from Concorde and current efforts to market a stretched version of the Caravelle transport,

*See note on preceding page.

the four French aircraft production groups--Dassault, Sud, Nord, and Breguet--are largely dependent on the production of jet fighters and other military aircraft. Furthermore, as the figures in Table 3 illustrate, nearly three quarters of French aerospace exports are military in nature. Therefore, there are strong incentives to continue developing successive versions of the Dassault Mirage series of jet fighters for exports and for the French Air Force.

Since the monetary crisis following the strikes of May 1968, it has been difficult to predict the exact development and production timetables of proposed new aircraft. The two most significant fighters scheduled for future production are the Mirage F-1 and Mirage G-4. The F-1 is currently in the flying prototype stage. This aircraft, 100 of which are on order by the French Air Force for delivery starting in the early 1970s, is a heavier and more powerful derivative of the Mirage III, intended for a low-level strike and penetration role. It will almost certainly be available for export and licensed production before 1975. Typical production rates of this and other French fighters will be on the order of five per month.

The Mirage G-4 is a much more advanced and heavier aircraft, a variable-geometry fighter-bomber intended to replace at least part of the Mirage IV bomber force and serve as the primary offensive aircraft of the French Air Force after 1975. According to the current timetable, first prototype flights will begin in late 1970, and series production could begin in time to provide an initial operational capability by 1975 at the latest. France has been very interested in offering the Mirage G-4 to West Germany as a substitute for the MRCA-75 program, but so far there is no indication that this will be transacted.

The G-4, according to available estimates, would have an MTOW on the order of 60,000 pounds. Thus, it really lies closer to the strategic bomber than strike fighter category; and if it were available to less developed country air forces in the late 1970s

would represent a qualitative change in existing de facto constraints on the arms traffic.

Currently, and probably on a continuous basis through the early 1970s, the principal French export aircraft are the Mach 2 Mirage III and its stripped-down export version, the Mirage V. The Mirage III is especially effective as an interceptor. Its cost, with avionics for all-weather intercept capability, is close to \$2 million. The Mirage V, without sophisticated avionics, sells for about \$1 million. Basically intended for ground attack, the Mirage V can carry a combat load of 8,800 pounds. These aircraft are currently on order in Belgium, Iraq, and Pakistan, as well as France. They have already been or are being delivered to Australia, Israel*, Lebanon, Switzerland, South Africa, and Peru. Remaining French orders probably assure production of the Mirage III and V into the early 1970s, and a vigorous export sales effort, especially for the Mirage V, seems likely. Current production rate is probably about six per month. As the figures in Appendix B indicate, France also has a rather surprising potential to export relatively large numbers of U.S. combat aircraft that are now being retired. Of special importance are the remaining inventories of F-84s, F-100s, and T-33s, which could be disposed of at low prices to clients in the less developed world.

3. West Germany. Although the German aircraft industry has, under pressure of the government and with the incentive of offset purchases, agreed to German reliance on U.S. combat aircraft procurements in the early 1970s, it is adamant in its conviction that Germany must produce its own fighter aircraft for deliveries starting in 1975. Otherwise, the industry has argued, Germany will forfeit its place as an important aircraft producer for the remainder of the century. Several unsuccessful attempts have already been made by the German industry to assure an F-104 replacement--e.g. the U.S.-German VTOL fighter project, and the German-Italian VAK-191B VTOL fighter. Currently, the MRCA-75 (previously described) appears much more likely

*Israel has the Mirage III and has on order the Mirage V. Whether these latter will ever be delivered remains uncertain.

to enter development and production, but the German defense establishment has retained a safeguard in the form of the NKF (New Combat Aircraft) project for an all-German fighter along the line of the German version of the MRCA-75. This would be a close-support tactical fighter powered by a U.S. engine.

West Germany's operational requirements for combat aircraft tend to be more clearly defined than those of Britain or France, largely because of the nature of the potential military threat. Therefore, the need for the procurement of about 600 aircraft gradually to replace the F-104 (and partially the G.91) starting in 1975 is generally acknowledged within the government.

The West German industry has the productive capacity to satisfy Luftwaffe needs for new fighter aircraft, but it is unlikely for both industrial and political reasons to become a significant exporter of new jet fighters. West Germany's primary impact on the combat aircraft export market in the 1970s will therefore be in the sale of surplus F-104s and G.91s. Under pressure to buy U.S. military products, Germany has previously gained approval to export surplus F-86s. Similarly, it will probably be unopposed by the United States in the later 1970s in selling F-104s abroad. Even considering the high attrition rate of F-104s in Luftwaffe service, at least 300 of these aircraft will probably be available for export in the later 1970s. About the same number of Fiat G.91s will probably also be available.

4. Italy. In the early 1970s, there will be four major aircraft programs underway in Italy, in addition to a wide variety of helicopters and light aircraft produced under license. Three of the four will be combat aircraft: the F-104S produced under license by Fiat for the Italian Air Force; the Fiat G.91Y, with two engines instead of the single-engine G.91 and with increased performance in all parameters; and the Macchi MB.326 armed trainer. Typical production rates for all types are about 3-4 per month. Later in the 1970s, Fiat plans to participate as subcontractor on the MRCA-75 program on a basis equivalent to the

Italian share of orders for the project.

The major current program is the F-104S to supplement the current F-104G inventory until the mid-1970s. Fiat will build a total of 165 F-104S fighters at a rate of four per month until 1972.

Prior to the introduction of the MB.326, Italy has not been a significant exporter of aircraft to the less developed countries. In addition to aircraft produced for the Italian market, the main export was the G.91 for the Luftwaffe. The MB.326, however, appears to be very competitive with other armed trainers on the basis of both cost and performance. (It sells for less than \$500,000.) The aircraft is being produced under license by Atlas Aircraft Industries in South Africa; and by Commonwealth Aircraft Corporation in Australia, which also holds the Southeast Asian sales rights. The MB.326 has been exported, so far, to the Congo (K), Tunisia, Argentina, and several others.

The Fiat G.91Y is a subsonic fighter with a weight and powerplant very similar to the supersonic F-5. Its initial cost, however, is probably lower than that of the F-5 or other light supersonic fighters. About 70 of these aircraft are on order by the Italian Air Force. In addition, a strenuous export sales effort among the smaller nations of Western Europe is being made.

Italy's main impact with regard to arms transfers in the 1970s appears to be in the Macchi MB.326, for which an export level of 30 per year would probably be very satisfactory to the manufacturer. There is also a modest potential for the export of surplus F-84s and F-86s (See Appendix B).

5. Sweden. In the 1970s, SAAB will continue to manufacture jet fighters and armed trainers, largely for the Swedish Air Force but possibly to some extent for export as well. Sweden has recently been regarded by other countries as a potential competitor in military aircraft sales in Latin America and elsewhere, but the actual Swedish governmental policy on arms exports may prove to be more stringent than these conjectures suggest. The combat aircraft currently in production are the Draken supersonic fighter and 105 armed trainer. In

the near future, the more advanced Viggen supersonic fighter will enter production and gradually supersede the Draken.

The Draken is a relatively heavy (35,000 pounds) fighter and interceptor, of which over 500 are now in the Swedish inventory. In addition, Denmark is taking delivery on about 70 of the aircraft. SAAB has mounted an export sales effort for the Draken, but as yet it has not appeared in other inventories. Following completion of the Danish order, further production will probably depend entirely on export sales, but there are probably limitations on the rate of production (affecting delivery dates and quantities) as well as terms of trade comparable to those offered by several other suppliers. Finally, there are the political strictures likely to be imposed by the Swedish government on potentially controversial transfers.

The SAAB 105, especially the 105XT export version, is Sweden's entry in the armed trainer category. Currently, twenty of the aircraft are on order by Austria, and it seems likely that Sweden would prefer to export these aircraft to other industrial nations, especially neutrals like Austria, rather than to the less developed world.

The Viggen, a high-performance supersonic fighter designed primarily for the air defense of Sweden, will be SAAB's main product in the 1970s. A very expensive system of unorthodox canard airframe configuration, it is not likely to be a strong contender in the export market, but the government and industry policies on Viggen export sales are not altogether clear. The Swedish Air Force has placed an initial order for 175 Viggens, and the total Swedish order is expected to reach 500 during the 1970s. The 450 subsonic Lansen fighters in the inventory will gradually be retired as the Viggens are introduced.

Consequently, in addition to an unknown potential for export sales of the SAAB Draken and 105, surplus Lansen could be available for export in the later 1970s, and Viggens might conceivably be exported from the mid-1970s on. It seems likely, however, that available

numbers would be fairly small.

6. Spain. In the early 1970s, three major aircraft production programs will be in progress at relatively low rates of production: at CASA, licensed production of the Northrop F-5, as well as the 207 medium transport; and at Hispano, the HA-220 armed trainer. For the Spanish Air Force, 70 F-5s are on order, all of which are likely to be completed by 1972-73. CASA, which has remained active throughout the post-war period through U.S. military licensed production, maintenance, repair, and overhaul contracts, will probably then seek some follow-on program of a similar nature.

As for export potentials, the inventory of F-86s, which will presumably become surplus in the early 1970s, could possibly be retransferred (see Appendix B). The HA-220, an uprated version of the Messerschmitt-designed HA-200, probably does not have a significant export potential. However, given the close relationship between the Spanish and Egyptian aircraft industries*, either export in very small numbers or production licenses to the UAR seem possible.

7. Canada. As Table 3 indicates, Canada's aircraft industry is among the five or six largest in the world. As the figures also show, it is primarily dependent on exports of civil and military aircraft as well as major parts and components. In the early 1970s, Canada's two aircraft manufacturers--Canadair and DeHavilland--will be engaged in a total of four production programs in the over-10,000 pounds class. Canadair will be manufacturing the F-5 supersonic fighter under license and the CL-41 armed trainer. DeHavilland will be manufacturing the Buffalo and Twin Otter utility transports in addition to several types of light aircraft.

*Specifically, Hispano Aviacion of Seville, in collaboration with Willy Messerschmitt, transferred HA-300 from Spain to the UAR. See John H. Hoagland and John B. Teeple, "Regional Stability and Weapons Transfer: The Middle Eastern Case," Orbis, Vol. IX, No. 7, Fall 1965.

Canadair production of the F-5 involves 115 aircraft for the RCAF and 105 for the Netherlands. The program will be completed by 1972, and Canadair will therefore be looking for a follow-on licensed production effort in the early 1970s. Other than the Dutch order, it seems unlikely that Canadair will export F-5s. Therefore, its other principal export effort concerns the CL-41 armed trainer, which has been offered to the United States Navy as a trainer and which has also been exported to Malaysia in an armed version. If the U.S. order is forthcoming, a base would be provided for a more active export program to the less developed world, in competition mainly with the BAC 167 and the Macchi MB.326.

Further Canadian potentials for military aircraft exports in the 1970s lie in the probable surpluses of F-104s in the later 1970s as well as possible current surpluses of F-86s and Lockheed T-33s. (Some of the Canadian T-33s listed in Appendix B are in squadron rather than training service and are therefore already equipped for combat missions.)

D. Eastern Europe

Several countries in Eastern Europe have maintained light aircraft industries throughout the postwar period. Most notable are the Polish, Czech, and Yugoslav national industries. In the case of Poland and Czechoslovakia, the industries have also been engaged periodically in the licensed production of Soviet civil and military aircraft. Currently, and into the 1970s, these three industries will be manufacturing armed trainers.

In Czechoslovakia, Aero is currently building the L-29 "Delfin" trainer, which has been purchased by the Soviet Union and Warsaw Pact nations as a standard air force trainer. In addition, it has been exported to the less developed world--most recently to Nigeria--as a combat aircraft. The L-29 production program presents an important anomaly. Characteristically, as this text has pointed out,

European major aircraft production lines operate at rates of three to six per month. According to published reports, about 2,000 L-29s have been built since production started in 1963, indicating a possible rate of over thirty per month. Since its acceptance by the Warsaw Pact as a standard trainer, the L-29 has been exported to the Soviet Union and other nations of Eastern Europe. It has also been exported either as an armed or unarmed trainer to the UAR, Syria, Indonesia, Cuba, Nigeria, and Uganda.

The Czechs have announced plans for a follow-on swept-wing fighter designated the L-39. Given the strength of the L-29 program and Czechoslovakia's history as a successful arms exporter, the L-29 offers an important export potential in the early 1970s and the L-39 later in the decade.

In Poland, the state aircraft enterprise OKL has manufactured the Iskra jet trainer for the Polish Air Force since 1962. Although the aircraft has a nose cannon and under-wing attachment points for armaments, it has not been exported in either an armed or unarmed version. Therefore, no strong Polish export potential is assumed to exist.

With regard to surplus aircraft, the assumption made here is that the Warsaw Pact inventories and surpluses including those of Poland and Czechoslovakia, are under strict Soviet control.

Finally, SOKO, the main Yugoslav aircraft factory, builds the Galeb jet trainer for the Yugoslav Air Force and Jastreb armed version for export. Through displays at international air shows and other media, SOKO has promoted the Jastreb in export markets, but no evidence of exports has appeared in the course of the present study. Aside from the Jastreb, Yugoslavia may have some export potential in the form of its inventory of more than 200 F-84s and F-86s, but such exports would probably have to await deliveries of new equipment.

E. Asia

Four Asian nations--Japan, India, Australia, and Communist China--will be engaged in series production of major aircraft in the

1970s.

1. Japan. In Japan, in the early 1970s, four major programs will be in progress at four different companies. Three of these are military programs. The largest will be Mitsubishi's licensed production of the F-4, over 100 of which are to be built starting in 1971. This program is scheduled to continue, at a rate of 1-2 per month, until 1977. Kawasaki is building the Lockheed P2J Neptune naval patrol bomber under license and is scheduled to deliver 46 of these aircraft to Japanese forces between 1970 and 1974. Finally, Shin Meiwa has developed a flying boat, the PS-1, which has been ordered by the Japanese government for ASW duties. None of these aircraft has a large export potential, because of license restrictions, low production rates, and other reasons.

By 1973, however, the Mitsubishi XT-2 fighter and trainer will be in production. This aircraft, like the Jaguar, is powered by two Rolls Royce-Turbomeca Adour engines, and its configuration is difficult to distinguish from the Jaguar. (The absence of protest from Britain or France suggests the possibility of informal technical collaboration in exchange for selection of the Adour engine.) About 60 XT-2s are to be delivered to the JASDF from 1973 to 1975, suggesting a low monthly production rate. Subsequently, the aircraft could probably be available for export sales. Although available numbers might be modest, the XT-2 would still represent an important new entry in the jet fighter export market in the context of Asian politics.

The large Japanese inventory of F-86s appears also to provide a significant export potential; and by the mid-1970s, the remaining F-104 inventory might be available for export. (The estimated quantities of all these aircraft are listed in Appendix B.)

2. India. India's aircraft industry is centered around the nationalized Hindustan Aeronautics Ltd. (HAL). At the beginning of the 1970s, HAL will be engaged in five programs: licensed production of the Soviet MiG-21 fighter; licensed production of the Hawker Siddeley 748

medium turboprop transport; licensed production of the Hawker Siddeley Gnat light subsonic fighter; production of the HF-24 subsonic fighter designed for HAL by the itinerant German design team of Kurt Tank; and production of the HJT-16 jet trainer designed by HAL personnel. Rates of production--where what is normally regarded as series production actually exists--are probably less than one per month.

It is clear that India's ambition and determination to become a self-sufficient producer of military aircraft are sharply offset by the existing level of industry and transportation. In spite of heavy investment in the HF-24, it still cannot be regarded as more than a training program for the industry. The MiG-21 program, started in 1962, has not yet been transformed into what could truly be regarded as domestic production, as evidenced by the fact that the Koraput Division of HAL delivered its first engine to the airframe plant at Nasik in late 1968. The Gnat program, although comparatively successful, obviously cannot answer India's combat aircraft requirements for much longer.

All of these factors must have led to India's decision to purchase a large number of Su-7 fighters from the Soviet Union. However, in the 1970s, India will undoubtedly seek to procure new types of strike aircraft either through direct import or local assembly under license. It seems very unlikely that any of the existing production efforts will last until the mid-1970s. The most likely course of events is that India will purchase the number of strike aircraft that are immediately needed--either from Soviet or Western sources--and simultaneously initiate licensed production of such aircraft. Jaguar is currently regarded as the most likely candidate.

As for potential exports, there is a very remote possibility that Indian-built MiG-21s could be exported to Indian or Soviet clients, but this would depend on the unlikely development of a successful licensed production program yielding high monthly rates. A further export potential may be provided by some of the aging fighters in the Indian inventory (listed in Appendix B), particularly the Ouragan, Mystere IV, and remaining Vampires--the Gnat, because of its domestic

military importance, does not appear to be a likely candidate for export.

3. Australia. Aust. lia has been a successful manufacturer of foreign aircraft ever since World War II. To serve the requirements of the RAAF, Commonwealth Aircraft Corporation and Government Aircraft Factories have successfully manufactured the DeHavilland Vampire, North American F-86, Dassault Mirage III, and Macchi MB.326.

By 1970, the more than 100 Mirage IIIs for the RAAF will be completed, as will the domestic orders for the Macchi MB.326 armed trainer. Commonwealth has the Southeast Asian sales rights for the MB.326 and presumably is searching for sales in the area to permit continuing production. More importantly, as a means of either supplementing or replacing the twenty four General Dynamics F-111s now on order, Commonwealth has entered discussions with BAC about having a light variable-geometry fighter designed especially for Australian production, with export sales one of the strong motives of the program. This aircraft, designated the AC-105, would be powered by one Rolls Royce Adour engine. Presumably, the combined marketing efforts of BAC and Commonwealth would be addressed to the export program, which could probably begin by 1973-74.

A very modest export capability is also provided by the existing F-86 and Canberra inventories listed in Appendix B.

4. Communist China. Published sources give no clear estimate of Communist Chinese aircraft production. It is clear that the World War II Japanese aircraft plant at Shen Yang (Mukden) was re-established with Soviet help in the late 1950s for production of MiG fighters. Recent MiG-19 exports to Pakistan give evidence of Chinese production of airframes and engines of reasonable quality.

The principal question, however, is whether or not the large-scale Chinese production of conventional battlefield weapons, on one

hand, and high-priority specialized and probably handcrafted production of a few ICBMs on the other, can be matched in the series production of aircraft. Experience has shown that sustained large-scale series production of modern jet fighters, especially supersonic fighters, requires a broad base of suppliers of subsystems, components, and materials; and these are precisely what Communist China seems to lack.

Therefore, although Communist China may be able to select a few clients of special importance such as Pakistan for the supply of aircraft, it seems unlikely that Communist China can become a major exporter of combat aircraft in the 1970s without drawing down its own inventories unacceptably.

III. PRINCIPAL TYPES OF AIRCRAFT AVAILABLE IN THE 1970s

Based on the preceding discussion and on the Appendices, some conclusions can be drawn about the availability of specific types of jet combat aircraft for export in the 1970s. In this section, three different classes of aircraft are considered: supersonic fighters; subsonic fighters; and subsonic armed trainers. The unit cost of new supersonic fighters of the present generation is normally in the \$1-3 million range. As more surplus aircraft of this class become available by the mid-1970s, the cost could conceivably drop below \$1 million. Unit cost of subsonic fighters direct from the production line will probably be in the \$.75-1 million range in the early 1970s, and surplus subsonic fighters will be purchased for a wide variety of costs, possibly as low as \$250,000 per unit for some types. The unit cost of new subsonic armed trainers will range from \$300,000 to \$500,000, and the used price will be considerably lower. In the remainder of this section, each of these classes is discussed in turn.

A. Supersonic Fighters

The existing world inventory of roughly 12,000 supersonic fighters consists of about twenty different types of aircraft in the inventories of about fifty air forces. The United States and Soviet Union probably account for about 60 percent of the current inventory. An additional 15 percent of the inventory is held by France, West Germany, Britain, and Sweden; and the remaining 25 percent is divided among about 45 nations.

Appendix B-2 provides a breakdown of quantity and distribution of each supersonic fighter in the world inventory. In terms of probable numbers and distribution in the 1970s, the most significant aircraft appear to be:

McDonnell-Douglas F-4, of which more than 2,000 are in inventory or on order in six countries

(U.S. inventory and orders total 1,680). The aircraft will probably continue in production for domestic and export sales at 40-50 per month in the early 1970s and be available in limited surplus quantities starting in the later 1970s.

Northrop F-5, more than 700 of which are in inventories or on order in twelve countries, and which will continue to be produced at more than ten per month as long as export orders continue.

Lockheed F-104, about 1,700 of which are in inventories or on order in fifteen airforces, and which will be retired from several major inventories starting in 1975. Although series production is ending (except in Italy), the F-104 will be an important aircraft on the surplus market from 1975 until at least 1980.

Mikoyan MiG-19, of which, in addition to an unknown but probably large number in the Soviet inventory, there appear to be at least 800 aircraft in the inventories of sixteen other countries (a few of which were built in Communist China). The degree of Soviet control over re-transfer is the key element in assessing further export potential.

Mikoyan MiG-21, of which, in addition to an unknown but very large number in the Soviet air force and in Communist China, there are probably about 1,000 aircraft in inventories and on order by seventeen other nations (if the Indian licensed production order backlog is included). Soviet exports of used MiG-21s will continue to be a

major increment of the total flow of supersonic fighters to the developing world in the first half of the 1970s.

Dassault Mirage III and V, nearly 1,000 of which are in inventory and on order in ten countries (French inventory and orders for Mirage III total about 500). Production at about six per month will continue as long as the aggressive sales programs continue to yield orders. Mirage exports in the 1970s will consist primarily of newly-produced rather than surplus aircraft.

Grumman F-14 advanced naval fighter, of which nearly 500 in successive versions are likely to be produced at high rates starting in 1972. This aircraft will inaugurate a new unit cost regime--on the order of \$8-10 million--which will effectively exclude it from less developed country markets in the 1970s.

U.S. F-15 air superiority fighter, over 1,000 of which could be produced at high rates in successive versions between 1975 and 1990. The F-15 will probably not be available for the less developed countries in the 1970s, but it will have a secondary impact by making more F-4s available for export. Like the F-14, its unit cost will be excessive in less developed country markets.

FOXBAT, a Mach 3 interceptor possibly of Mikoyan design, which may enter the Soviet operational inventory in 1970 and which could be exported to a few very highly favored clients before 1975.

It will also have the effect of freeing other aircraft in the Soviet inventory for export.

FLOGGER, a VG fighter, probably for missions including strike and close support, possibly of Mikoyan design; which could be exported to favored clients in need of strike aircraft in the 1970s--e.g. India.

FAITHLESS, a delta wing STOL fighter with auxiliary lift jets, possibly of Mikoyan design, which could be especially well suited to the requirements of Arab forces in the 1970s as a means of reducing airfield vulnerability.

FLAGON A and B, a twin-jet fighter in versions with and without lift jets, and probably of Sukhoi design. This aircraft, like the Yakovlev fighter-bombers it will replace in Soviet service, is not as likely to be exported as the various types of MiG fighters.

BAC/Breguet Jaguar light strike fighter, of which 200 each are on order by Britain and France, and for which export orders are being sought. The unit cost of less than \$2 million, combined with probable credit incentives, makes this potentially an important export fighter in the early 1970s. Licensed production in other countries--e.g. India--will also increase the numbers available.

BAC Lightning interceptor, continuing production of which at roughly five per month will depend on export sales. Basically designed as an interceptor,

it is now being produced for export in a ground attack version, presumably with less electronics and more weapons load.

SAAB Viggen, intended primarily for the Swedish Air Force (probable total of 500 to be built for domestic market in the 1970s) but which may also be available for export. Conservative Swedish export policies and relatively high unit costs will limit its export potential. A more likely Swedish export potential is the SAAB Draken, the unit cost of which is probably under \$1 million and which will be gradually replaced by the Viggen in the Swedish inventory during the 1970s.

Dassault Mirage F, a fighter-bomber for strike missions on order by French Air Force and possibly ~~available~~ for export by the mid-1970s.

Dassault Mirage G-4, a VG fighter-bomber, deliveries of which to the French Air Force could begin by 1974, and which could be available for export after 1975.

European tactical fighter (e.g. MRCA-75), production of which by Britain, West Germany, and others could begin by 1975 and which could be available for export by 1978. This aircraft will also have the effect of making surplus F-104s available for export after 1975.

Mitsubishi XT-2 fighter/trainer similar to the Jaguar, which could be available in the second half of the 1970s.

B. Subsonic Fighters and Light Bombers

The current world inventory of about 18,000 subsonic fighters consists of roughly thirty different types in the inventories of about eighty air forces. These types range from aircraft built in the early post-war period, such as the Gloster-Meteor and Dassault Ouragan, up to current models such as the LTV A-7. The most significant aircraft, in terms of either quantity or distribution, are:

Republic F-84 (over 1,000 in twelve countries) and North American F-86 (about 2,000 in 26 countries) plus whatever U.S. surplus exists at Davis-Monthan AFB. These aircraft will be available in a relatively free market and at low cost in the 1970s. Their attractive performance, combined with the existing familiarity of many air forces with their maintenance and operation, assure a continuing demand for both aircraft.

LTV F8, over 600 of which are in the U.S. inventory, but which is not likely to be an important export fighter.

McDonnell-Douglas A-4, over 900 of which are in four countries (over 800 of them in U.S. inventory) and which continues in production at relatively high rates. This aircraft is likely to emerge as a significant element in the jet fighter traffic in the 1970s.

LTV A-7, about 1,000 of which are in the U.S. inventory and on order. Foreign interest in this aircraft as of mid-1969 is just commencing. Its impressive range and payload may help to create both demand abroad and caution at home regarding its export.

Mikoyan MiG-15 (a possible 1,800 in about 18 countries [including an estimated 1,000 in China] plus an unknown quantity in the USSR) and Mikoyan MiG-17 (a possible 2,000 in about 22 countries plus an unknown quantity in the USSR) will continue in the 1970s to be important elements of the Soviet export program, particularly to the smaller and poorer less developed countries.

Ilyushin Il-28, over 1,000 of which are now in about 20 countries (over half of them in the Soviet inventory).

Hawker Hunter, over 700 of which are now in about fifteen countries. Their further availability depends on Hawker Siddeley's ability to repurchase surplus Hunters and rebuild them for export to the less developed world. The performance of the aircraft has generally been attractive to less developed countries.

AX, a USAF requirement for a subsonic twin-turboprop close support fighter, to be in production at high rates before the mid-1970s.

Fiat G.91Y twin-jet follow-on version of the G.91, which will be in production at low rates into the early 1970s.

Hawker Siddeley Harrier VTOL fighter, which will be produced throughout the 1970s. The cost and highly specialized nature of this aircraft will limit its distribution in the less developed world.

In conclusion, the Soviet Union does not appear to have any subsonic fighter production programs scheduled, but the large inventory of MiG-15s and MiG-17s gives it a strong export potential in this field. The United States has an especially strong export potential in the A-4, which could be supplied either from surplus or direct from production lines. The most striking export potential for subsonic fighters appears to be the large and widespread inventory of F-84s and F-86s, which are likely to be traded in a market relatively free of political control.

C. Subsonic Armed Trainers

These aircraft have several strong advantages in the developing country market. Their initial price is low for a new aircraft; they combine a trainer with an operational fighter, greatly reducing the cost of pilot training; they are simple to operate and maintain; and, because of a strongly competitive situation, they offer a wide range of options in equipment and armaments. The main armed trainers in production in the early 1970s, at typical rates of 5-10 per month, will be the BAC 167, SAAB-105XT, Sud Magister, Macchi MB.326, Canadair CL-41, SOKO Galeb or Jastreb, Czech L-29 or L-39 Delfin, and finally the Cessna A-37. These aircraft can be sold as first equipment for new air forces, or as replacements for subsonic fighters of earlier vintage.

Out of surplus, it does not appear that there will be many armed trainers available. One exception could be the Lockheed T-33, about 500 of which are in about fourteen inventories other than the United States; and possibly the Magister, of which there are about 800 in twelve inventories.

A P P E N D I X A

Appendix A-1

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1975

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant*</u>	<u>Remarks</u>
Argentina	DELTA	IA.58	COIN	12,000	2xturboprop	provisional domestic order of 80

possible alternative would be licensed production of U.S. COIN aircraft or helicopter gunship.

Australia	Commonwealth/ Government Aircraft Factories	-	supersonic fighter (L)**	(L)		
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Australian Government has historically maintained licensed production of jet fighters to meet domestic requirements and keep industry operating at minimum level. Licensed production of a U.S., French, or British jet fighter to augment F-111s purchased from U.S. is very likely in 1970s. Commonwealth and BTC may proceed with AC.105 project for a light VC fighter powered by one Turbomeca RR Adour. Export markets would be sought.

Canada	Canadair	will probably acquire a U.S. or West European fighter production license to follow CF-105.				
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*For turboprops, the power output is given in equivalent horsepower (eph), for turbojets and turbofans, power is pounds of thrust (lb thr).

**L designates licensed production.

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1975 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
Canada (cont.)	De Havilland	-	lt. transport	-	2xturboprop	
		DHC-4	STOL transport	30,000	4xP&W PT/A-50	
		Twin Otter, Buffalo, or subsequent utility transports in production.				
China	Shen Yang	MiG-21 mod.	supersonic fighter	under 20,000	1xturbojet	
		-	bomber		turbojet	
Czechoslovakia		I-39	armed trainer		1xMotorlet Al-25 (3235 lb thr)	export market
		I-410 or other	lt. transport	11-12,000	2xP&W PT-6 (600 chp)	
France	Breguet/Dassault	Jaguar	supersonic fighter	up to 29,000	2xRR/Turbomeca Adour (6950 lb thr) with BAC	co-production
		126	trainer		2xSNECMA/Turbomeca Larzac (2300 lb thr)	
	Dassault	Mirage F	supersonic fighter-bomber	33,000	1xadv. version of SNECMA Atar 9K with about 16,000 lb thr	initial order of 100 for French Air Force starting in early 1970s

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1975 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>WTOw</u>	<u>Powerplant</u>	<u>Remarks</u>
France (cont.)		Mirage G-4	VG fighter-bomber	60,000	2adv. version of Atar 3K	deliveries to French Air Force starting 1974-75 to replace Mirage IV
	Dassault	Hirondelle	lt. transport		2xturboprop	
		Mercur 2	med. transport		2xP&W JT8D (14,000 lb thr)	
	Sud	stretched Caravelle 12B	med. transport	125,000	2xP&W JT8D (14,000 lb thr)	deliveries start 1971
		Concorde	SST	380,000	4xB.S./SNECMA Olympus (35-40,000 lb thr)	if Concorde is series produced, it will still be in production in 1975
		A-300 Airbus or Variant	hvy transport			
	Nord	C-161J	jet follow-on to Transall mill. transport	100,000+	2xP&W JT3D (18,000 lb thr)	co-production with VFW
Germany (FRG)	Messerschmitt Bolkow	MMF or MCA- 75 or U.S. license	supersonic fighter	30-40,000	1xP&W TF30 or 1-2xRR RB.199	deliveries of 500- 700 aircraft to West German AF beginning 1975 to replace F-104G and C.91

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1975 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
Germany (cont.)	Dornier	DO 131 or other	tactical trans- port	16,000	2xRR P 9.168 (12,444 lb thr) + possible 14 RR R.B. 162 lift engines (5990 lb thr) 2xSNECMA/Turbomeca Larzac (2200 lb thr)	
		---	armed trainer	8,800		
	VF	C-161J	jet follow-on to Transall	100,000+	2xP&W JT3D (18,000 lb thr)	co-production with Nord
		614	lt. transport	38,030	2xRR M45H (7700 lb thr)	
	HAL	licensed production of supersonic strike aircraft such as Jaguar				licensed assembly or production at low rates
		HJT-16	trainer	under 10,000	1xB.S. Viper by HAL (L)(under 2000 lb thr)	production at low rates perhaps including an armed version
	IAI	Jet Commander	lt. transport	16,800	2xGE CJ610 (2850 lb thr)	if still in pro- duction, then aimed primarily at export market

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1975 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MtOW</u>	<u>Powerplant</u>	<u>Remarks</u>
Israel (cont.)	IAI (cont.)	Arava	lt. transport	12,500	2xP&W PT-6 (620 hp)	
<p>Less likely but possible would be series production of an Israeli-developed subsonic ground attack fighter or supersonic interceptor and fighter-bombers. Israeli spokesmen have argued in behalf of such programs, but their implementation seems unlikely by 1975. More likely is the continuing improvement of IAI's capability to maintain, overhaul, and modify combat aircraft of foreign manufacture.</p>						
Italy	Fiat	Foreign license to follow F-104S is possible	supersonic fighter		Fiat (L)	
		G.222 mod.	tactical transport	58,000		40-50 current domestic orders
	Macchi	M.B.326 or follow-on	armed trainer	under 15,000	B.S.Viper or Orpheus (L)	primarily for export
	Piaggio	P.D. 808 or subsequent with U.S. tech. assistance	lt. transport	under 20,000	B.S.Viper or other (L)	
Japan	Mitsubishi	XT-2	supersonic armed trainer		2xRR/Turbomeca Adour (L)	deliveries 1973-75 to JASDF. About 60 domestic orders

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1975 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
Japan (cont.)		F-4(L)	supersonic fighter	54,600	2xGE J79 (L) (16,500 lb thr)	Rate of 1-2 per month continuing to 1977.
	Kawasaki	P-2J Neptune	naval patrol	74,950	2xGE T64 (L) (2850 ehp) + aux turbojets	present order of 46 to be completed by 1974
	NAMC	Y-X	med. transport	60,000	2xturbofan	to replace YS-11
		C-1	med. transport	80,000	2xP&W JT-8	could be merged with Y-X
	Shin Meiwa	PS-1	ASW flying boat	86,862	4xGE T64 (L) (2850 ehp)	present orders to be completed by 1973. Doubtful but possible that it will still be in production.
Nether-lands	Fokker	F-28 or other medium transport	med. transport	60,000	2xturbofan	single or co-production

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1975 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
Poland	OKL	Iskra follow-on	armed trainer	10,000	turbojet	possible
So. Africa	Atlas	continued licensed production of M.B. 326 or a subsequent light fighter. French, Spanish, or Italian licenses most likely.				
Spain	Hispano	HA-220	armed trainer		Turbomeca 1x1 Marbore 6	possibly still in production
Sweden	SAAB	Viggen	supersonic fighter	35,000+	1xPW JT8D by Svenska Flyg- motor (L) (26,450 lb thr)	deliveries 1971- to late 1970s
		105XT	armed trainer	14,330	2xGE J85 (2850 lb thr)	depends on export orders
		1071	STOL transport			
		1073	short-haul trans- port	63,000	2xRR RB203-8	
USSR	Antonov	AN-12	med. transport	134,480	4xIvchenko AI-20 (4000 ehp)	
		AN-22	jumbo transports	551,160	4xKuznetsov (15,000 ehp)	
		AN-24	med. transport	46,000	2xIvchenko AI-24 (2550 ehp)	
			STOL transport			

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1975 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
USSR (cont.)	Beriev	BE-30	lt. transport	12,568	2xturboprop (970 ehp)	
	Ilyushin	IL-62	hvy. transport	347,000	4xKuznetsov (23,000 lb thr)	
		IL-74	med. transport (150 passenger)			
	Mikoyan	Foxbat ^a	Mach 3 fighter	70,000	2xturbojet (24,250 lb thr)	
		Flogger ^a	VG fighter (multi mission)	40,000	1xturbojet (24,000 lb thr)	
		Faithless ^a	delta-wing STOL fighter	40,000	1xturbojet 2 or more lift jet	
	Sukhoi	Flagon A ^b	long range fighter		2xturbojet (14,500 lb thr)	
		Flagon B ^b	long range STOL fighter	44,000	2xturbojet (14,500 lb thr) + 2 lift engines	
	Tupolev	TU-134	med. transport	98,000	2xSoloviev D-30 (14,900 lb thr)	

^aMikoyan design assumed but far from certain

^bSukhoi design generally assumed

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1975 (continued)

Country	Organization	Designation	Type	MTOW	Powerplant	Remarks
USSR (cont.)		TU-154	SST	260,000+	4xNK-154	
		TU-154	med. transport	176,000	Iskuznetsov NK-8	
		TU-164			20,947 lb thr)	
	Yakovlev	YAK-40	med. transport	30,208	Islychenko turboprop (1307 lb thr)	
UAR	Helwan	possible licensed production of an armed trainer				
United Kingdom	BAC	Concorde	SST	380,000	4xRR/SNECMA Olympus	co-production with Sud
		311	hvy. transport		2xRR RB211	deliveries in 1974-75. Depends partly on fate of A-300 Airbus
		Jaguar	supersonic fighter	up to 29,000	2xRR/Turbomeca Adour (6950 lb thr)	emphasis on exports in mid-70s. Co-production with Breguet
		167 or follow-on	armed trainer	under 12,000	1xturbojet	for export market

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1975 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MCTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
United Kingdom (cont.)		MRCA-75 or Variant	VG fighter	40,000	2xRR RB.166	replacement to F-104, Canberra, Buccaneer
	Hawker siddeley	Harrier or follow-on	VTOL fighter	16,000	1xRR Pegasus (24,000 lb thr)	emphasis on exports
		-	med. turboprop transport			
		-	lt. turboprop transport			to replace Jetstream and H.S. 125
United States	Boeing	727	med. transport	169,000	3xP&W JT8D (14,000 lb thr)	
		737	lt./med. transport	107,000	2xP&W JT8D (14,000 lb thr)	
		747	jumbo transport	733,000	4xP&W JT9D (45,000 lb thr)	
			SST	675,000	4xGE GE4 (60,000 lb thr)	
		767	Airbus	-	-	

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1975 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
United States (cont.)	Cessna	A-37B or follow-on	armed trainer	14,000+	2xturbojet	
		Possibly F-106X or other air defense interceptor				
	Grumman	F-14	naval supersonic fighter	55,000	2xP&W TF30 (22,000)	subsequently 2x29,000 lb thr GE or P&W turbofan
		Gulfstream II	lt. transport	57,500	2xRR Spey (11,400)	450-500 to be built starting 1972
		Possibly F-12 long-range interceptor for continental air defense.				
	Lockheed	1011 Airbus	hvy. transport	409,000	3xRR RR.211 (40,600 lb thr)	
		C-5	jumbo mil. transport	764,000	4xGE TF39 (41,000 lb thr)	
		Possibly F-12 long-range interceptor for continental air defense.				

Will also probably be producing some of the following types: hi-speed, hi-altitude strategic recon, naval patrol, medium and light transports, helicopter gunships, possibly fighters.

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1975 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
United States (cont.)	LTV	A-7 Corsair	could still be in production. If not, the production of a follow-on close support fighter seems likely.			
	Mc Donnell Douglas	DC-8	hvy. transport	up to 350,000	4xP&W JT3D (19,000 lb thr)	
		DC-9	med. transport	up to 114,000	2xP&W JT8 (14,000 lb thr)	
		DC-10	jumbo transport	400,000+	3xGE CF6-6 (39,500 lb thr)	
		Assume F-4 line in St. Louis will be closed by 1975, but this is not at all certain. Export orders could keep it open. Otherwise, combat aircraft production to meet USAF or USN requirements are likely.				
	No. American Rockwell	Assume completion of T-2B, Sabreliner, and RA-5C Vigilante before 1975. Options for future include light transports and a variety of combat aircraft including major USAF requirements now pending.				
	Unknown	F-15	supersonic air superiority fighter	40,000	2xGE or P&W (25,000 lb thr)	operational by 1975. Thousands to be built
	AX	COIN			2xturboprop	
	VSX	carrier-based ASW			2xGE TF34 (9000 chp)	GD & Lockheed competing

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1975 (continued)

Country	Organization	Designation	Type	Units	Powerplant	Remarks
		ANSA	strategic bomber	350,000	4xturboprop	First operational deliveries in 1976
		CSX	advanced close support fighter			
Yugoslavia	SOKO	Jastreb	lt. fighter	10,100	1xB.S. Piper 531 (3000 hp thr)	

Appendix A-2

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1970

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u> (lbs.)	<u>Powerplant</u> [*]	<u>Remarks</u>
Argentina	DINFIA	IA50 Guarani II	lt. transport	15,700	2xTurbomeca Bastan (930 chp)	small no. to be produced
Australia	Commonwealth	Mirage III and MB.326H			series production	completed
Canada	Canadair	CL-41	armed trainer	11,288	1xGE J85 J4 (2950 lb thr)	
		CF-5(L) ^{**}	supersonic fighter		2xGE J85 by Orenda (L) (4300 lb thr)	115 to be built for Canada, 105 for Netherlands
	DeHavilland	DHC-5 Buffalo	lt. transport	41,000	2xGEI64 (3055 chp)	Production rate 9/mo.
		DHC-6 Twin Otter	lt. transport	12,500	2xP&W PT-6 (579 chp)	

^{*} For turboprops, the power output is given in equivalent horsepower (chp), for turbojets and turbofans, power is pounds of thrust (lb thr).

^{**} Designates licensed production.

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1970 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>Model</u>	<u>Powerplant</u>	<u>Remarks</u>
China	Shen Yang	MI G-19	fighter (1)			
		MI G-21 mod	supersonic (1) fighter			
		Also rumors of bomber production				
Czechoslovakia	Omnipol	I-29 Delfin	armed trainer	7,804	1xNN-701 (1960 lb thr)	over 2,000 built 500 on order
France	Breguet (Dassault)	Jaguar	supersonic fighter	up to 29,000	2xRR, 1xTomeca Adour (6950 lb thr)	co-production with BAC, 400 on order
		Atlantic	naval patrol	95,900	2xRR Tyne by Hispano Suiza (L) (6105 ehp)	production into early 1970s
		Mirage III & V	supersonic fighter	29,000	SNECMA Atar 9 (13,670 lb thr)	
		Fan Jet Falcon	lt. transport	27,115	2xGE CF700 (4250 lb thr)	
	Nord	262	lt. transport	22,930	2xTurbomeca Astazou (1065 ehp)	production ending
		Transall	mil. transport	up to 108,000	2xRR Tyne (1100 ehp)	co-production with VFW

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1970 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
	Sud	Caravelle & Super Caravelle	med. transport	up to 114,000	up to 2xP&W JT-8 (14,000 lb thr)	
		Concorde	SST	367,000	4xB.S. Olympus	co-production with BAC
		Magister	armed trainer	7,055	2xTurbomeca Marbore (1058 lb thr)	
Germany (FRG)	HFB	Hansa 320	lt. transport	20,280	2xGE CJ610 (2950 lb thr)	
	VFW	Transall C-160	mil transport	up to 180,000	2xRR Tyne (6100 ehp)	co-production with Nord
India	HAL Bangalore	IJT-16	trainer	8,660	1xB.S. Viper by HAL (L) (2500 lb thr)	total of 150 to be produced
		HF-24	fighter	20,000	2xB.S. Orpheus by HAL (L) (4850 lb thr)	
		Hawker Siddeley Gnat (L)	lt. fighter		1xB.S. Orpheus by HAL (L) (4859 lb thr)	production nearing end

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1970 (continued)

Country	Organization	Designation	Type	Model	Powerplant	Remarks
India (cont.)	BAL Kampur	Blacket Siddaleev 7-48 (L)	med. transport	44,495	2xRR Dart by HAL (L) (2105 chp)	production probably to end in 1970
	BAL Hyderabad Koraput, Nasik	MIG-21 (F)	supersonic fighter		1x licensed engine	
Israel	IAI	Arava	lt. transport	12,500	2xP&W Can. PT-6 (620 hp)	
		Jet Commander	lt. transport	16,800	2xGE C1610 (2850 lb thr)	production facilities purchased from U.S.
Italy	Aermacchi	N.6. 326	armed trainer	up to 9,500	1xB.S. Viper 11 by Piaggio (L) (3410 lb thr)	
	Fiat	F-104S (L)	supersonic fighter		1xGE J79 by Fiat (L)	Production rate of 4/mo. to 1972
		G.91Y	fighter	19,180	2xGE J85 (4080 lb thr)	
	Piaggio	PD808	lt. transport	18,000	B.S. Viper 11 by Piaggio (L) (3350 lb thr)	

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1970 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
Japan	Kawasaki	P-2J Neptune	naval patrol	74,950	2xGE T64 (2850 lb thr)	46 to be built for delivery 1970-1974
	Mitsubishi	Phantom II F4 (L)	supersonic fighter	54,600	2xGE J79 by Ishikawajima	pre-production phase. Series to start in 1971
	Shin Meiwa	PS-1	ASW flying boat	86,862	4xGE T64 (L) (2850 ehp)	
	NANC	YS-11	med. transport	54,000	2xRR Dart (3060 ehp)	production to 1971
Nether- lands	Fokker	F-27	med. transport	44,000	2xRR Dart (2050 ehp)	may still be in production
		F-28	med. transport	56,700	2xRR Spey Jr. (9850 lb thr)	
Poland	OKL	Iskra	armed trainer	7,935	1xturbojet (2205 lb thr)	low rate of production
South Africa	Atlas	M.B. 326 "Impala" (L)	armed trainer	9,500	1xB.S. Viper by Piaggio (3410 lb thr)	400 to be built

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1970 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
Spain	CASA	207	med. transport	36,376	2xBristol Hercules (2040 ehp)	low rate of production
		F-5 (L)	supersonic fighter	19,500	2xGE J85 (4080 lb thr)	70 on order through 1970
Sweden	SAAB	HA-220	armed trainer		1xTurbomeca Marbore 6	25 on order by SAF
		35 & 35X Draken	supersonic fighter	35,270	1xRR Avon by Svenska Flygmotor (L)	
		105XI	armed trainer	14,330	2xGE J85 (2850 lb thr)	
USSR	Antonov	J37 Viggen	supersonic fighter		1xPW JT-8 by Svenska Flygmotor (L)	
		AN-12	med. transport	134,480	4xIvchenko AI-20 (400 ehp)	
		AN-22	jumbo transport	551,160	4xKuznetsov (15,000 ehp)	
		AN-24	med. transport	46,000	2xIvchenko AI-24 (2550 ehp)	

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1970 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
USSR (cont.)	Beriev	BeL-30	lt. transport	12,568	2x (970 ehp)	
	Ilyushin	IL-18	med. transport	140,000	4xIvchenko AI-20 (4000 ehp)	
		IL-62	hvy. transport	347,000	4xKuznetsov NK-8 (23,150)	
	Mikoyan	MiG-21	supersonic fighter	16,700	1xR-37F (13,120 lb thr)	
		Foxbat ^a	Mach 3 fighter	77,000	2x28,000 lb thr	
		Faithless ^a	delta-wing STOL fighter	40,000	1 propulsion engine & 2 or more lift engines	
		Flogger ^a	VG strike fighter	40,000	1x24,000 lb thr	
	Sukhoi	SU-7B	supersonic fighter- bomber	29,000	1x (22,000 lb thr)	
		Flagon A ^b	long-range fighter		2x14,500 lb thr	
		Flagon B ^b	STOL fighter	44,000	2x14,500 lb thr cruise engines (plus 2 lift engines)	
		SU-9	supersonic fighter-interceptor		1x22,000 lb thr	

^aMikoyan design assumed

^bSukhoi design assumed

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1970 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
USSR (cont.)	Tupolev	TU-134	med. transport	98,000	2xSoloviev D-30 (14,900 lb thr)	
		TU-144	SST	260,000+	4xNK-144	
		TU-154	med. transport	176,000	3xKuznetsov NK-8 20,947 lb thr)	
		TU-22	supersonic med. bomber	175,000	2x	
	Yakovlev	YAK-40	lt. transport	30,208	3xIvchenko AI-25 (3307 lb thr)	
UAR	Helwan	YAK-28	supersonic fighter	30,000	2x (8800 lb thr)	
		YAK-42	long-range fighter	160,000	2x	
		HA-300	fighter		1xB.S. Orpheus	a few to be produced
	BAC	Concorde	SST	367,000	4xB.S. Olympus	co-production with Sud
United Kingdom		Lightning	supersonic fighter		2xRR Avon (14,430 lb thr)	
		167/Provost	armed trainer	11,500	1xB.S. Viper Mk. 535 (3410 lb thr)	

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1970 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
United Kingdom (cont.)	BAC	Jaguar	supersonic fighter	up to 29,000	2xRR/Turbomeca Adour (6950 lb thr)	co-production with Breguet
		Super VC-10	hvy. transport	335,000	4xRR Conway (22,500 lb thr)	production almost ended
		BAC-111	med. transport	up to 98,000	2xRR Spey	production almost ended
	Handley Page	Herald	med. transport	43,000	2xRR Dart (1910 ehp)	production almost ended
		Jet Stream	lt. transport	14,500	2xTurbomeca Astazou (850 ehp)	
	Hawker Siddeley	H.S. 125	lt. transport	22,800	2xB.S. Viper (3360 ehp)	
		H.S. 748	med. transport	44,495	2xRR Dart (2105 ehp)	may still be in production
		Trident	med. transport	143,500	3xRR Spey	production to early 1970s
		Harrier P.1127	VTOL fighter	16,000	1xB.S. Pegasus (19,200 lb thr)	71 on order in 1969
Short		Skyvan	lt. transport	12,500	2xAir Research 331 (715 ehp)	orders being sought

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1970 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
United States	Boeing	707/720	hvy. transport	up to 330,000	4xP6W JT3D (18,000 lb thr)	rate of 8-10 per month
		727	med. transport	169,000	3xP6W JT8D (14,000 lb thr)	
		737	lt./med. transport	107,000	2xP6W JT8D (14,000 lb thr)	
		747	jumbo transport	733,000	4xP6W JT9D (45,000 lb thr)	
	Cessna	A-37B	armed trainer	14,000	2xGE J85 (2850 lb thr)	
	Fairchild-Hiller	FH-227B	med. transport	45,500	2xRR Dart	production about ended
	General Dynamics	F-111	VG supersonic fighter-bomber	70,000	2xP6W TF30 (20,000 lb thr)	
	Grumman	Gulfstream II	ex. transport	57,500	2xRR Spey (11,400 lb thr)	3-4/month
		S2E Tracker	recon	29,150	2xWright R1820 (1525 hp)	production almost ended
		EA-6B Intruder	ECM	58,500	2xP6W J52 (9300 lb thr)	about 40 night fighters and tanker versions still on order

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1970 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
United States (cont.)	Grumman (cont.)	OV-1E	recon	19,230	2xLycoming T53 (1100 ehp)	production ends 1970
		Gulfstream I	lt. transport	35,100	2xRR Dart (2210 ehp)	2/month
		F-14	naval supersonic fighter	55,000	2xP&W TF30 (22,000 lb thr)	preproduction
	Lockheed	P3B Orion	naval patrol	134,000	4xAllison T56 (4190 ehp)	production nearing completion
		YF-12A/SR-71	hi supersonic recon		2xP&W JT-11 (32,500 lb thr)	
		1011 Airbus	jumbo transport	409,000	3xRR RB 211 (40,600 lb thr)	
		C-130	cargo	155,000	4xAllison 501 (4050 ehp)	
	LTV	Jetstar	lt. transport	42,000	4xP&W JT12 (2570 lb thr)	2/month
		C-5	jumbo mil. transport	764,000	4xGE TF39 (41,000 lb thr)	
		A-7 Corsair	fighter	32,500	1xP&W TF-30 (11,350 lb thr)	total production over 1000
McDonnell-Douglas	F-4 Phantom II		supersonic fighter	54,600	2xGE J79 (16,500 lb thr)	3/day

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1970 (continued)

Country	Organization	Designation	Type	Value	Powerplant	Remarks
United States (cont.)	McDonnell-Douglas (cont.)	A-4F Skyhawk	fighter-bomber	27,420	1xJ52 (9,000 lb thr)	over 2,000 built since 1953
		DC-8	hvy. transport	up to 350,000	4xP&W JT3B (19,000 lb thr)	
		DC-9	med. transport	up to 114,000	2xP&W JT-8 (14,000 lb thr)	
	North American Rockwell	DC-10	jumbo transport	400,000+	3xGE CF6-6 (39,500 lb thr)	
		RA-5C Vigilante	supersonic fighter	80,000	2xGE J79 (10,900 lb thr)	continuous since 1956
		T-38 Talon	trainer	12,000	2xGE J85 (2680 lb thr)	continuous since 1956
Yugoslavia	Jastreb	F-5	supersonic fighter	19,800	2xGE J85 (4080 lb thr)	10/month
		F-5-21			2xGE J85-21 (10,000 lb thr)	
			lt. fighter	10,100	1xB.S. Viper 531 (3000 lb thr)	

Appendix A-3

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1960

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u> [*]	<u>Remarks</u>
Argentina	DINFIA	IA 35 Huanquero	lt. transport	12,000	2xEI Indio (750 hp)	
Australia	Commonwealth	F-86 Sabre (L) ^{**}	fighter	17,300	1xRR Avon (L) (7500 lb thr)	over 110 built to 1960; 189 to 1961
	DeHavilland	Vampire (L)	fighter			
Canada	Canadair	CL-44	hvy. cargo	200,000	4xRR Tyne (5730 ehp)	based on Bristol Britannia
		540 (L)	med. transport	53,200	2xNapier Eland (3500 ehp)	licensed Convair 440
		CF-104 (L)	fighter			
	DeHavilland	Caribou	lt. transport	26,000	2xP&W R2000 (1450 hp)	
China	State Aircraft Factory, Shen Yang	MIG-17 (L)	fighter			

^{*} For turboprops, the power output is given in equivalent horsepower (ehp), for turbojets and turbofans, power is pounds of thrust (lb thr).

^{**} Designates licensed production.

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1960 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
Czechoslovakia	Avia	MIG-17 (L)	fighter			
		MIG-19 (L)	fighter			
		Il-28 (L)	lt. bomber			
		Il-14 (L)	med. transport	39,683	2xASH-82T (1900 hp)	
France	Breguet	Alize	naval ASW	18,000	1xRR Dart (1975 ehp)	
		Etendard IV	fighter	23,000	1xSNECMA Atar 8 (9700 lb thr)	100 built to 1960
	Dassault	Mirage III	supersonic fighter	20,000	1xSNECMA Atar 9 (14,110 lb thr)	Mach 2.4
		Mystere IV	fighter			production completed
	Fouga	Magister	trainer	6,280	2xTurbomeca Marbore (880 lb thr)	
	Nord	Noratlas	cargo	50,705	2xBristol Hercules by SNECMA (L) (2040 hp)	
	Sud	Caravelle	med. transport	103,500	2xRR Avon (10,500 lb thr)	
		Vautour	fighter-bomber	40,000	2xSNECMA Atar (7716 lb thr)	

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1960 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
Germany (FRG)	Focke-Wulf	F-104 (L-final assembly)	supersonic fighter	22,000	1xGE J79 by BMW (L) (15,800 lb thr)	
	Heinkel/Fouga	Magister (L)	trainer			
		Fiat G.91 (L)	lt. fighter			
		F-104 (L-final assembly)	supersonic fighter	22,000	1xGE J79 by BMW (15,800 lb thr)	
	Weser	Noratlant (L-final assembly)	cargo			
Germany (GDR)	State Factory	Il-14P (L)	med. transport	about 38,000	2xAsh-82 (1900 hp)	production ended in 1960
Israel	Israel Aircraft Industries	Magister (L)	trainer			1-2/month
Italy	Fiat	G.91	lt. fighter	11,700	1x Bristol Siddely Orpheus (5000 lb thr)	several hundred built to 1960

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1960 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
Italy (cont.)	Macchi	MB326	fighter/trainer	7,430	1xS.S. Viper by Piaggio (L) (2500 lb thr)	
Japan	Mitsubishi	F-86 (L)	fighter			produced to December 1960
		F-104J (L)	supersonic fighter	22,000	G.E. J79 by Ishikawajima (L) (15,800 lb thr)	
Netherlands	Fokker	F-27	med. transport	37,500	2xRR Dart (1600 ehp)	
Spain	CASA	202 Halcon	lt. transport	21,273	2xWright Cyclone (1200 hp)	20 to be built
		207 Azor	med. transport	34,510	2xBristol Hercules (2040 hp)	10 to be built
	Hispano	HA-200	fighter-trainer	6,995	2xTurbomeca Marbore (880 lb thr)	
Sweden	SAAB	35 Draken	supersonic fighter	19,800	mod. RR Avon by Svenska Flygmotor (L) (15,200 lb thr)	

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1960 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
United Kingdom	Armstrong Whitworth	Argosy	cargo	88,000	4xRR Dart (1910 ehp)	
	AVRO	Vulcan	hvy. bomber		4xB.S. Olympus (17,000 lb thr)	
	Blackburn	Buccaneer	fighter/bomber		2xDeH. Gyron jr.	
	Bristol	Britannia	hvy. transport			production ended
	DeHavilland	Comet IV	med. transport	73,000	4xRR Avon (10,500 lb thr)	
		Heron	lt. transport	13,500	4xGipsy Queen (250 hp)	139 built to 1960
		Sea Vixen	fighter		2xRR Avon	
		Vampire	trainer version			
	English Electric	Lightning	supersonic fighter		2xRR Avon (14,430 lb thr)	
	Folland	Gnat	lt. fighter	8,885	1xB.S. Orpheus (4,520 lb thr)	
	Handley Page	Dart Herald	med. transport	39,000	2xRR Dart (2105 ehp)	
	Hawker	Hunter	fighter	20,000	1xRR Avon	2000 built to 1960

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1960 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
United Kingdom	Hunting (BAC)	Jet Provost	med. trainer	6,195	1x B.S. Viper (1750 lb thr)	
	Scottish	Twin Pioneer	lt. transport	14,600	2x Alvis Leonides (600 hp)	
	Vickers	VC-10	hvy. transport	299,000	4x RR Conway (20,250 lb thr)	
		Vanguard	hvy. transport	146,500	4x RR Tyne (5050 ehp)	
		Viscount	med. transport	72,500	4x RR Dart (1990 ehp)	
United States	Westland	Fairey Gannet	naval patrol		1x B.S. Double Mamba (1x3875 ehp)	production ending
	Boeing	707/720/KC 135	hvy. transport	300,000	4x P&W JT3 (16,800 lb thr)	
		B-52	hvy. bomber	488,000 (H version)	8x P&W J-57 (13,750 lb thr)	500 built to 1960 out of 704 ordered
	Chance Vought	F8U Crusader	supersonic fighter	27,000	1x P&W J57 (16,000 lb thr)	

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1960 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
United States (cont.)	Convair	880	med/hvy transport	189,500	4xGE CJ805 (11,650 lb thr)	
		F-106	supersonic fighter	35,000+	1xP&W J75 (24,500 lb thr)	
		B-58	supersonic med. bomber	160,000+	4xGE J79 (15,600 lb thr)	
	Douglas	A3D Skywarrior	fighter-bomber	70,000	2xP&W J57 (10,500 lb thr)	
		A4D Skyhawk	fighter-bomber	17,295	1xWright J65 (770 lb thr)	
		DC-8	hvy. transport	273,000	4xP&W JT3 (J57) (13,500-1,6800)	
		C-133 Cargomaster	hvy. cargo	286,000	4xP&W T34 (6000 ehp)	
Fairchild		F-27 (L)	med. transport	37,500	2xRR Dart (1720 ehp)	
Grumman		Mohawk	recon	12,000	2xLycoming T53 (1005 ehp)	
		Gulfstream	lt. transport	33,600	2xRR Dart (2105 ehp)	
		S2F Tracker	recon	21,000	2xWright R 1820 (1520 hp)	
Lockheed		Electra/P3V	med. transport / naval patrol	116,000	4xAllison 501 (4050 ehp)	

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1960 (continued)

Country	Organization	Designation	Type	Model	Powerplant	Remarks
United States (cont.)	Lockheed (cont.)	C-140	hov. cargo	155,000	4xAllison F-56 (4050 chp)	
		Jet Star	lt. transport	38,640	4xP&W JT12 (3000 lb thr)	
	McDonnell	Phantom II	supersonic fighter	40,000+	2xGE J79 (16,150 lb thr)	
		F-101 Voodoo	supersonic fighter	50,000	2xP&W J57 (14,500 lb thr)	production ended Dec. 1960 over 800 built
USSR	No. American	T-39	trainer	17,760	2xP&W J60 (3000 lb thr)	
		A30 Vigilante	supersonic fighter	49,500	2xGE J79 (15,000 lb thr)	
	Northrop	T-38 Talon	trainer	11,500	2xGE J85 (3850 lb thr)	
	Republic	F-105	supersonic fighter/bomber	48,400	1xP&W J75 (26,500 lb thr)	
	Antonov	An-8	med. transport		2xIvchenko AI-20	
		An-10	med. transport		4xIvchenko AI-20	
USSR	Ilyushin	An-12	med. cargo		4xIvchenko AI-20	
		Il-18	med. transport		4xIvchenko AI-20	

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1960 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
USSR (cont.)	Tupolev	Tu-16	med. bomber		2x Mikulin AM-3 (20,950 lb thr)	
		Tu-114	hvy. transport		4x Kuznetsov NK-12 (14,795 chp)	
		Tu-95	hvy. bomber		4x Kuznetsov NK-12 (14,795 chp)	
		Tu-104	med. transport		2x Mikulin AM-3 (19,180 lb thr)	
	Myasishchev	Mya-4	hvy. bomber		4x NK-120 (28,660 lb thr)	
	Mikoyan	MiG-21	supersonic fighter		1x R-37F (13,120 lb thr)	
	Sukhoi	Su-7	Supersonic fighter		1x 22,000 lb thr	

Appendix A-3

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1950

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant*</u>	<u>Remarks</u>
Australia	DeHavilland	Vampire (L)**	fighter		RR Nene (L)	
Canada	Canadair	DC-4 (L)	transport	82,300	4xRR Merlin (L) (1760 hp)	
France	Breguet	76-3	hvy. transport	105,800	4xP&W R2800 (2000 hp)	about 15 built mainly to sup- port Algerian operations
	Dassault	Flamant	lt. transport	13,200	2xRenault (600 hp)	colonial liaison
		Ouragan	fighter	12,350	1xRR Nene by Hispano Suiza (L) (5000 lb thr)	about to enter production
	Sud-Est	Languedoc	med. transport	50,000		production ending; small quantity
		Armagnac	hvy. transport	165,000	4xP&W (3500 hp)	small quantity

* For turboprops, the power output is given in equivalent horsepower (ehp), for turbojets and turbofans, power is pounds of thrust (lb thr).

** Designates licensed production.

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1950 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
France (cont.)	Sud-Ouest	S.O. 95 Corse	lt. transport	12,346	2xRenault (590 hp)	
		S.O. 30 Bretagne	med. transport	40,700	2xP4W (2000 hp)	10 built to 1950
Italy	Fiat	G.212	med. transport	39,600	3xP4W Twin Wasp (1830 hp)	
		SIAI Marchetti S495	med. transport	47,600	4xAlfa Romeo (850 hp)	
Sweden	SAAB	Scandia	med. transport	35,000	2xP4W (1450 hp)	
		SAAB 29	fighter		1xDeH. Ghost by Svenska Flygmotor (L) (5000 lb thr)	
		SAAB 21	jet trainer		1xDeH. Goblin by Svenska Flygmotor (L)	
United Kingdom	Airspeed	Ambassador	med. transport	52,000	2xBristol Centaurus (2700 hp)	
	A. V. Roe	Shackleton	naval reconn.	150,000	4xRR Griffon (2450 hp)	extensively rebuilt Lincoln bomber

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1950 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
United Kingdom (cont.)	Bristol	Type 170	cargo	40,000	2xBristol Hercules (1700 hp)	
	DeHavilland	Comet I	hvy. transport	105,000	4xDeH. Ghost (5000 lb thr)	
		Hornet	piston fighter	18,250	2xRRR Merlin (2030 hp)	
		Venom	fighter		1xDeH. Ghost (5000 lb thr)	
		Heron	lt. transport	12,500	4xDeH. Gipsy Queen (250 hp)	
		Vampire	fighter	12,170	1xDeH. Goblin (3100 lb thr)	
	English Electric	Canberra	lt. bomber		2xRRR Avon (6000 lb thr)	
	Fairey	Firefly	piston recce. fighter	16,096	1xRRR Griffon (2250 hp)	
	Gloster	Meteor	fighter			
	Handley Page	Hastings/ Hermes	mil/civil med. transport	80,000	4xBristol Hercules (1675 hp)	
		Narathon	lt. transport	18,000	4xDeH. Gipsy Queen (275 hp)	

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1950 (continued)

Country	Organization	Designation	Type	Stock	Powerplant	Remarks
United Kingdom (cont.)	Hawker	Sea Hawk	fighter		1xRR Nene (5000 lb thr)	
		Sea Fury	piston fighter	12,350	1x Bristol Centaurus (2550 hp)	
	Percival	P.50 Prince	lt. transport	10,650	2x Alvis Leonides (520 hp)	
	Short	Solent	med. transport	79,000		prod. ending
		Sturgeon	naval recce	22,100	2xRR Merlin (1660 hp)	
United States	Supermarine	Attacker	fighter	11,500	1xRR Nene (5000 lb thr)	
	Boeing	B-47	med. bomber	200,000	6xGE J47 (5200 lb thr)	production just started
		B-50	piston bomber			production ending
	Chance Vought	Stratocruiser/ C-97	hvy. transport	142,500	4xP&W Double Wasp (2800 hp)	
		F4U Corsair	piston fighter	13,297	1xP&W R2800 (2400 hp)	
	Consolidated Vultee	Convair 240	med. transport		2xP&W R2800 (1800 hp)	

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1950 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MIOW</u>	<u>Powerplant</u>	<u>Remarks</u>
United States (cont.)	Consolidated Vultee (cont.)	B-36	hvy. bomber	300,000	6xP&W R4360 (3000 hp)	
		AD Skyraider	piston fighter		1xWright R-3350 (2400 hp)	
	Douglas	DC-6	med. transport	97,000	4xP&W R2800 (2100 hp)	
		C-124 Globemaster	cargo	175,000	4xP&W R4360 (3500 hp)	production starting
Fairchild	Grumman	C-119 Packet	cargo	54,000	2xP&W R4360 (3250 hp)	
		F9F Panther	fighter		1xP&W J42 (5000 lb thr)	
		Albatross	naval patrol		2xWright Cyclone (1425 hp)	
Lockheed	Lockheed	F-80/F-94	fighter		1xAllison J33 (4600 lb thr)	
		P2V Neptune	naval patrol	64,110	2xWright R3350 (2500 hp)	
		Constellation	hvy. transport	100,000	4xWright R3350 (2500 hp)	

MAJOR AIRCRAFT IN SERIES PRODUCTION: 1950 (continued)

<u>Country</u>	<u>Organization</u>	<u>Designation</u>	<u>Type</u>	<u>MTOW</u>	<u>Powerplant</u>	<u>Remarks</u>
United States (cont.)	McDonnell	52H Banshee	fighter	17,000	2xWestinghouse J34 (3150 lb thr)	
	No. American	FJ-1 Fury	fighter	12,697	1xAllison J35 (4000 lb thr)	
		F-86 Sabre	fighter	16,500	1xGE J47 (5200 lb thr)	
		B-45	med. bomber	82,600	4xGE J47 (5200 lb thr)	
		AJ-1	attack fighter		2xP4W R2800	
	Northrop	C-125	cargo	38,000	3xWright R1820 (1200 hp)	
		F-89 Scorpion	fighter	32,000	2xAllison J35 (5000 lb thr)	
	Republic	F-84	fighter	20,000	1xAllison J35 (5000 lb thr)	700 built to 1949
USSR	Ilyushin	Il-10	piston fighter			
		Il-12	med. transport	38,000	2xASH-82 (1900 hp)	
		Il-28	lt. bomber		2xVK-1 (5955 lb thr)	
	Mikoyan	MiG-9(?)	fighter			
		MiG-15	fighter	11,270	1xRD-45 (6000 lb thr)	
		MiG-17	fighter	11,270		
	Tupolev	Tu-4	hvy. bomber		4xASH pistons	

A P P E N D I X B

Appendix B-1

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(By Country)

based on public data as of March 1969

<u>Country</u>	<u>Aircraft</u>	<u>Inventory</u>	<u>On Order</u>
Afghanistan	MiG-17	80-100 ^b	
	MiG-21	30	
	Il-28	50	
Albania	MiG-15	24-30	
	MiG-17	30-35	
	MiG-19	10	
Algeria	MiG-15	20	
	MiG-17	40	
	MiG-21	50	
	Il-28	20-30	
Argentina	McDonnell Douglas A4B	25	25(?)
	No. American F-86	25	
	Morane Saulnier Paris ^a	45	
	Gloster Meteor ^a	25	
	Macchi MB.326K	24	
	Grumman F9B ^a	15	
	Dinfia IA58		80
Australia	Dassault Mirage III	110	
	No. American F-86	40-60	
	BAC Canberra	35-40	
	Macchi MB.326H	30	
	McDonnell Douglas A4G	10	
	DeHavilland Vampire	24	
	General Dynamics F-111	24 (subject to acceptance)	

Key to Footnotes:

^aretirement effective or imminent^bdiffering estimates on number in active service or inventory^crough estimates deduced from indirect evidence^dno basis for estimating number^eincludes versions of F-86 built under foreign license

Note: Quantities are shown by type of aircraft regardless of role-- e.g. whether in combat squadron service or used as trainers or reconnaissance aircraft. See pp. 1-2 for notes on interpreting these figures.

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Country)

<u>Country</u>	<u>Aircraft</u>	<u>Inventory</u>	<u>On Order</u>
Austria	SAAB-29 ^a	20-25	
	Sud Magister	15	
	DeHavilland Vampire	5	
	SAAB-105XT		20
Belgium	Lockheed F-104G	65-90	
	Republic F-84	70-100	
	Sud Magister	45	
	Dassault Mirage V	88	18
	Dassault Mirage III	12	
Brazil	Gloster Meteor ^a	0-10 ^b	
	Lockheed F-80 ^a	50	
	Sud Magister	5	5
	Lockheed T-33	50	
	Cessna T-37C	65	
Bulgaria	MiG-15	10	
	MiG-17	120	
	MiG-19	60	
	MiG-21	30	
	Il-28	--- ^d	
	L-29 Delfin	--- ^d	
Burma	DeH. Vampire	10	
	BAC Jet Provost	40	
	Lockheed T-33	10	
	No. American F-86	10	
	Cessna T-37		
Canada	McDonnell F-101B/CF-101	60	
	Lockheed F-104D/CF104	110	
	Canadair CL-41	190	
	Lockheed T-33	160	
	Northrop CF-5		115
Cambodia	MiG-15	5	
	MiG-17	10	
	MiG-19	75 ^c	
	Sud Magister	5	

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Country)

<u>Country</u>	<u>Aircraft</u>	<u>Inventory</u>	<u>On Order</u>
Chile	Lockheed F-80 ^a	20-30	
	Lockheed T-33	5	
	DeH. Vampire ^a	5	
	Hawker Hunter	20	
China	Mikoyan MiG-15	1000	
	Mikoyan MiG-17	500	
	Mikoyan MiG-19	100	
	Mikoyan MiG-21	----d	
	Ilyushin Il-28	150-300 ^b	
	Tu-16	10	
China (Taiwan)	Lockheed F-104	50-65 ^b	
	McDonnell Douglas F-101	15-25 ^b	
	No.American F-100	45-60 ^b	
	No.American F-86	250-275 ^b	
	Northrop F-5	10-20 ^c	----d
	Martin B-57	----d	
Colombia	No. Am. & Canadian F-86	5	
	Lockheed T-33	----d	
	Cessna T-37		10
Congo (K)	MB. 326		17
Cuba	MiG-15	60	
	MiG-17	100	
	MiG-19	75	
	MiG-21	50	
Czechoslovakia	MiG-15		
	MiG-17	400-500	
	MiG-19		
	MiG-21	30	
	Ilyushin Il-28	30	
	Sukhoi Su-7	----d	
	L-29 Delfin	----d	
Denmark	Hawker Hunter ^a	20-30	
	Lockheed F-104	25	
	No.American F-100 ^a	45-60 ^b	
	Republic F-84	20	
	Lockheed T-33	25	
	SAAB Draken	23	46

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Country)

<u>Country</u>	<u>Aircraft</u>	<u>Inventory</u>	<u>On Order</u>
Dominican Republic	De H. Vampire ^a	20	
Ecuador	Gloster Meteor ^a	10	
	Lockheed F-80 ^a	10	
	BAC Canberra	5	
	Lockheed T-33	----d	
Ethiopia	BAC Canberra	5	5-7
	No.American F-86	10	
	Lockheed T-33	----d	
	Northrop F-5	----d	
Finland	MiG-21	40	
	H.S. Gnat ^a	10	
	Sud Magister	80	
	DeH. Vampire ^a	15	
	MiG-15 ^a	5	
	Il-28 ^a	5	
France	Dassault Mirage III	375	120
	Dassault Mirage IV	60	
	Dassault Super Mystere	110	
	Dassault Mystere IV	160	
	Sud Vautour	80	
	Sud Magister	275	
	Republic F-84F ^a	140	
	No. America F-100D ^a	60	
	Lockheed T-33 ^a	150	
	No. American F-86 ^a	5	
	BAC/Breguet Jaguar		200
	LTV F8 ^a	40	
	Dassault Etendard IV	70-85	
	Mirage F1		100
East Germany	MiG-15	100	
	MiG-17	260	
	MiG-19	30	
	MiG-21	30	
	Il-28	----d	
	L-29 Delfin	----d	

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Country)

<u>Country</u>	<u>Aircraft</u>	<u>Inventory</u>	<u>On Order</u>
West Germany	Lockheed F-104G	580	50
	Fiat G.91	335	22
	Republic F84F	50	
	Sud Magister	235	
	Lockheed T-33	100	
	McDonnell Douglas F-4		88
Ghana	Macchi MB.326	5	
Greece	Lockheed F-104	20	
	Republic F-84 ^a	110	
	No. American F-86	25	
	Northrop F-5	50 ⁱ	30
	Lockheed T-33	10	
Hungary	MiG-15	----d	Total 70-140 ^b
	MiG-17	----d	
	MiG-21	----d	
	L-29 Delfin	----d	
India	MiG-21 (L)	90-100	300
	HAL HF-24	20-30	
	Sukhoi Su-7	100	
	Hawker Hunter	150-190 ^b	
	Dassault Mystere IV	60-110 ^b	
	Hawker Siddeley Gnat (L)	200-250 ^b	
	Dassault Ouragan ^a	50-100 ^b	
	De H. Vampire ^a	30	
	BAC Canberra	50	
	HJT-16	175-200 ^b	
Indonesia	MiG-15	----d	Total 55
	MiG-17	----d	
	MiG-19	----d	
	MiG-21	15	
	Il-28	40	
	Tu-16	25-30	
	L-29 Delfin	----d	
Iran	Northrop F-5	115	
	No. American F-86	70	
	Lockheed T-33	15	
	McDonnell Douglas F-4	36	

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Country)

<u>Country</u>	<u>Aircraft</u>	<u>Inventory</u>	<u>On Order</u>
Iraq	Tu-16	5	
	Il-28	10	
	Hawker Hunter	50	
	MiG-17 ^d		
	MiG-19 ^d	45	
	MiG-21	60	
	BAC Jet Provost	20	
	Dassault Mirage III ^d		54
	Dassault Mirage V ^d		
	Su-7	20	
	L-29 Delfin	---- ^d	
Israel	Dassault Mirage III	65	
	Dassault Super Mystere	15	
	Dassault Mystere IV	35	
	Dassault Ouragan	45	
	Sud Vautour	15	
	Sud Magister	65	
	Douglas A4D	48	12
	McDonnell Douglas F4		50
Italy	Lockheed F-104G/S	105	165
	No. American F-86K	50	
	Fiat G.91R	275	
	Republic F-84K	100	
	Macchi MB.326	-100	
	Fiat G.91Y		55 + 20 optional
Japan	Lockheed F-104J	220	
	No. American F-86	300	
	Lockheed T-33	190	
	McDonnell F-4		104
	Mitsubishi XT-2		60
Jordan	No. American F-86	4	31
	DeH. Vampire ^a	15	
	Hawker Hunter	15	15
	Lockheed F-104	35	

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Country)

<u>Country</u>	<u>Aircraft</u>	<u>Inventory</u>	<u>On Order</u>
No. Korea	MiG-15	15	
	MiG-17	375	
	MiG-19	50	
	MiG-21	30	
	Il-28	70	
So. Korea	No. American F-86	150-170	
	Lockheed T-33	5	
	Northrop F-5	45	
Kuwait	BAC Jet Provost/167	5	
	Hawker Hunter	15	
	BAC Lightning	15	
Lebanon	Hawker Hunter	10	
	DeH. Vampire	5	
	Dassault Mirage III	15	
	Sud Magister	5	
Malaysia	Canadian CL-41	20	
	Australian F-16		10
Mexico	Lockheed T-33	15	
Morocco	MiG-17	15	
	Il-28	2	
	Sud Magister	30	
	Northrop F-5	16	
Muscat & Oman	BAC-167/ Jet Provost	12	
Netherlands	Lockheed F-104G	100	
	Republic F-84	up to 175 ^b	
	Northrop F-5		105
	Lockheed T-33	30	
New Zealand	BAC Canberra	10	
	DeH. Vampire	15	
	McDonnell Douglas A-4		14
Nicaragua	Lockheed T-33	5	

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Country)

<u>Country</u>	<u>Aircraft</u>	<u>Inventory</u>	<u>On Order</u>
Nigeria	MiG-15	5	10-15
	MiG-17	10	
	L-29 Delfin	10	
	BAC Jet Provost	1	
	Il-28		
Norway	Lockheed F-104	30	
	Northrop F-5	80-95 ^b	
	Republic F-84 ^a	20	
	No. American F-86 ^a	75	
Pakistan	MiG-19	40-60 ^b	40-60
	No. American F-86 ^e	140-160 ^b	40
	Lockheed F-104	10	
	Martin B-57	15-20	
	Lockheed T-33	15	
	Il-28	4	30-40
	Dassault Mirage III	32	10 ^c
	Su-7		----c,d
	MiG-21		----c,d
Peru	MiG-15	4	
	Hawker Hunter	15	
	No. American F-86	20	
	BAC Canberra	5	
	Dassault Mirage V	15	
	Cessna T-37	25	
Philippines	No. American F-86	40	
	Northrop F-5	20	
Poland	MiG-15 ^d		
	MiG-17 ^d		
	MiG-19 ^d	750	
	MiG-21 ^d		
	Il-28	80	
	Sukhoi Su-7	--- ^d	
	Iskra TS-11	--- ^d	
Portugal	Republic F-84	50	
	No. American F-86	50	
	Fiat G.91	35	
	DeH. Vampire	--- ^d	

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Country)

<u>Country</u>	<u>Aircraft</u>	<u>Inventory</u>	<u>On Order</u>
Rhodesia	DeH. Vampire	15	
	Hawker Hunter	10+	
	BAC Canberra	15+	
	Jet Provost	----d	
Rumania	MiG-15 ^d		
	MiG-17 ^d		
	MiG-19 ^d	250-350 ^b	
	MiG-21 ^d		
	Il-28 ^d		
	Delfin L-29	----d	
Saudi Arabia	BAC Lightning	40	16
	BAC 167	25	
	No. American F-86	10	
	Lockheed T-33	10	
	Hawker Hunter ^a	5	
Singapore	BAC 167	16	
	Hawker Hunter	20	
Somalia	MiG-15	10	
	MiG-17	5	
South Africa	No. American F-86	30	
	Dassault Mirage III	32-42	16
	Hawker Siddeley Buccaneer	15	
	De H. Vampire	50	
	BAC Canberra	10	
	Macchi MB.326	50 ^c	250
So. Yemen	BAC 167	8	
	MiG-17	10	
Spain	Lockheed F-104G	20	
	No. American F-86	150-200 ^b	
	Hispano HA-200	190	
	Northrop F-5 (L)	35 ^c	35 ^c
	Hispano HA-220		25
Sudan	BAC-167		---d

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Country)

<u>Country</u>	<u>Aircraft</u>	<u>Inventory</u>	<u>On Order</u>
Sweden	SAAB Draken	550	
	SAAB Lansen	450	
	Hawker Hunter	----d	
	SAAB Viggen		175 (initial;
	SAAB Sk60 (105)	150	500 total)
Switzerland	Hawker Hunter	90	
	DeH. Venom	215	
	Dassault Mirage III	58	
Syria	MiG-15 ^d		
	MiG-17 ^d	100	
	MiG-21	120	
	Il-28	5	
	Sukhoi Su-7	55	
	L-29 Delfin	----d	
Thailand	No. American F-86	50	
	Northrop F-5	25	
	Lockheed T-33	5	
Trucial States	Hawker Hunter	----d	
Tunisia	Macchi MB.326	5	1
Turkey	No. American F-86	160	
	No. American F-100	100	
	Republic F-84	180	
	Lockheed F-104	35	
	Northrop F-5	140	
Uganda	MiG-17	10+	
	Sud Magister	5	
	Delfin L-29	--	
USSR ^e	MiG-15	----d	
	MiG-17	----d	
	MiG-19	----d	
	MiG-21	----d	
	Mikoyan Foxbat		----d
	Mikoyan Flogger		----d

^eSee Table 3.

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Country)

<u>Country</u>	<u>Aircraft</u>	<u>Inventory</u>	<u>On Order</u>
USSR (cont.)	Mikoyan Faithless		----d
	Sukhoi SU-7	----d	
	Sukhoi SU-9	----d	
	Sukhoi Flagon A/B		----d
	Yakovlev Yak-25	----d	
	Yakovlev Yak-28		----d
	Yakovlev Yak-42	----d	
	Ilyushin Il-28	700-800 ^b	
	Tupolev Tu-16	900-1100 ^b	
	Tupolev Tu-20	120-140 ^b	
	Tupolev Tu-22	150-250 ^b	----d
	Myasishchev M-4	100-120 ^b	
	L-29 Delfin	----d	
United Arab Republic	MiG-15	120	
	MiG-17		
	MiG-19	80-100	
	MiG-21	110-135 ^b	----d
	Ilyushin Il-28	30-40	
	Sukhoi Su-7	40-55	
	Tupolev Tu-16	10	
	L-29 Delfin	----d	
United Kingdom	Handley Page Victor	75 ^c	
	Hawker Siddeley Vulcan	80 ^c	
	BAC Canberra	195	
	BAC Lightning	140	
	Hawker Hunter	265	
	DeH. Vampire	50	
	Hawker Siddeley Gnat	70	
	BAC Jet Provost	300	100
	DeH. Sea Vixen	150	
	Hawker Siddeley Buccaneer	165	
	McDonnell Douglas F-4	30	114
	Hawker Siddeley Harrier		90
	BAC/Breguet Jaguar		200

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Country)

<u>Country</u>	<u>Aircraft</u>	<u>Inventory</u>	<u>On Order</u>
United States	Boeing B-52	510	
	General Dynamics B-58	50	
	Martin B-57	30	
	General Dynamics F-102	550	
	General Dynamics F-106	275	
	McDonnell Douglas F-101	200	
	Lockheed F-104	50	
	Northrop F-89J	30	
	McDonnell Douglas F-4	1550	130
	No. American F-100	600	
	Republic F-105	300	
	No. American F-86	100	
	Republic F-84	200	
	Cessna A-37	200	
	LTV-F8D	650	
	McDonnell Douglas A-3	120	
	McDonnell Douglas A-4	700	150
	Grumman A-6	200	up to 40
	No. American A-5/RA-JC	80	
	LTV A-7	500 ^c	500 ^c
	General Dynamics F-111		235 (+265?)
	No. American OV-10A	-----d	
	Grumman F-14		several hundred
	Lockheed YF-12A	-----d	-----d
	F-15		-----d
	BAC Harrier		12
Uruguay	Lockheed F-80 ^a	5	
	Lockheed T-33	5	
Venezuela	No. American F-86	75-95 ^b	
	BAC Canberra	5	
	BAC Jet Provost	15	
No. Vietnam	MiG-15	60	
	MiG-17	35	
	MiG-21	20	
	Il-28	5	

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Country)

<u>Country</u>	<u>Aircraft</u>	<u>Inventory</u>	<u>On Order</u>
So. Vietnam	Northrop F-5	20	
	Cessna A-37	20	40
Yemen	MiG-17	10	
	Il-28	10	
	MiG-19	24	
	MiG-21	-----d	
Yugoslavia	MiG-19	30	
	MiG-21	50	
	Republic F-84	120	
	No.American F-86	130	
	Lockheed T-33	30	
	SOKO Jastreb	15	
Zambia	Macchi MB.326		-----b

Appendix B-2

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(By Aircraft Type)

based on public data as of March 1969

A. Supersonic Fighters

1. U.S. (production ended)

McDonnell Douglas F-101

Canada	60
U.S.	200
China (Taiwan)	15-25

General Dynamics F-102

U.S.	550
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Republic F-105

U.S.	300
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General Dynamics F-106

U.S.	275
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No. American F-100

France	60
U.S.	600
China (Taiwan)	45-60
Denmark	45-60
Turkey	100

2. U.S. (in production)

North American A-5

U.S.	80
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McDonnell-Douglas F-4 (plus licensed production in Japan)

W. Germany	88 on order
Israel	50 on order
Japan	104 on order
UK	144 inventory & orders
U.S.	1680 inventory & orders
Iran	36

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Aircraft Type)

Northrop F-5

Canada	115 on order
Netherlands	105 on order
Spain	70 on order
China (Taiwan)	10-20
Greece	50 (+30 possible on order)
Iran	115
S. Korea	45
Morocco	16
Philippines	20
Thailand	25
Turkey	140
So. Vietnam	20

Lockheed F-104 (foreign licensed production only)

Canada	110
W. Germany	630 inventory & orders
Italy	270 inventory & orders
Japan	220
Netherlands	100
Spain	20
U.S.	50
Belgium	65-90
China (Taiwan)	50-65
Denmark	25
Greece	20
Jordan	35
Norway	30
Pakistan	10
Turkey	35

General Dynamics F-111

Australia	24 on order
U.S.	235 up to 500 on order

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Aircraft Type)

Lockheed YF-12A

U.S.	inventory & orders unknown
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3. U.S. (in development)

Grumman F-14

U.S.	several hundred to be ordered
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F-15

U.S.	several hundred up to thousands to be ordered
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4. Soviet Union (Soviet production ended, may be in production
in China)

Mikoyan MiG-19

China	100
Czechoslovakia	unknown
Poland	unknown
Soviet Union	unknown
UAR	80-110
Yugoslavia	30
Albania	10
Bulgaria	60
Cambodia	75
Cuba	75
E. Germany	30
Hungary	unknown
Indonesia	unknown
Iraq	unknown
N.Korea	50
Pakistan	40-60
Yemen	24

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Aircraft Type)

5. Soviet Union (in production or late development)

Mikoyan MiG-21

China	unknown
Czechoslovakia	30
India	100 + possible 300 on order
Poland	unknown
Soviet Union	unknown
UAR	110-135
Yugoslavia	50
Afghanistan	30
Algeria	50
Bulgaria	30
Cuba	50
Finland	40
E.Germany	30
Hungary	unknown
Indonesia	15
N.Korea	30
Syria	120
N.Vietnam	20
Yemen	unknown

Sukhoi Su-7

Czechoslovakia	unknown
India	100
Poland	unknown
Soviet Union	unknown
UAR	40-55
Iraq	20
Pakistan	unknown number possibly on order
Syria	55

Sukhoi Su-9

Soviet Union	unknown
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POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Aircraft Type)

Yakovlev Yak-28		
	Soviet Union	unknown
Yakovlev Yak-42		
	Soviet Union	unknown
Foxbat		
	Soviet Union	unknown inventory and orders
Flogger		
	Soviet Union	unknown inventory and orders
Faithless		
	Soviet Union	unknown inventory and orders
Flagon A/B		
	Soviet Union	unknown inventory and orders

6. Western Europe (in production)

BAC/Breguet Jaguar		
	France	200 on order
	UK	200 on order
BAC Lightning		
	UK	140
	Kuwait	15
	Saudi Arabia	40

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Aircraft Type)

Dassault Mirage III

Australia	110
France	495 inventory and on order
Israel	65
Belgium	12
Iraq	unknown number on order
Lebanon	15
Pakistan	18 plus possible 10 on order
Switzerland	58
So. Africa	32-42 plus possible 16 on order

Dassault Mirage V

Belgium	106
Iraq	unknown number on order
Peru	15

SAAB Draken

Sweden	550
Denmark	69 inventory and on order

SAAB Viggen

Sweden	175 up to 500 on order
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7. Western Europe (in development)

Dassault Mirage F

France	100 on order
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Dassault Mirage G-4

France	orders forthcoming
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POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Aircraft Type)

8. Japan (in development)

Mitsubishi XT-2

Japan

initial order of 60

B. Subsonic Fighters and Light Bombers

1. U.S. (production ended)

Republic F-84

France	140
W.Germany	50
Italy	100
Netherlands	up to 175
U.S.	200
Yugoslavia	120
Belgium	70-100
Denmark	20
Greece	110
Norway	20
Portugal	50
Turkey	180

North American F-86

Argentina	25
Australia	40
France	5
Italy	50
Japan	300
So.Africa	30
Spain	150-200
U.S.	100
Yugoslavia	130
Burma	10
China (Taiwan)	250-275
Columbia	5
Ethiopia	10
Greece	25
Iran	70
Malaysia	10 on order

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Aircraft Type)

North American F-86 (cont.)

Jordan	4
S. Korea	150-170
Norway	75
Pakistan	140-160
Peru	20
Philippines	40
Portugal	50
Saudi Arabia	10
Thailand	50
Turkey	160
Venezuela	75-95

Grumman F9F

Argentina	15
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LTV F8

U.S.	650
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Northrop F-89

U.S.	30
------	----

McDonnell Douglas A3

U.S.	120
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Lockheed F-80

Brazil	50
Chile	20-30
Ecuador	10
Uruguay	5

Martin B-57

U.S.	30
China	unknown
Pakistan	15-20

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Aircraft Type)

2. U.S. (in production)

McDonnell Douglas A4

Argentina	25
Australia	10
Israel	48
U.S.	850 inventory and on order
New Zealand	14 on order

Grumman A6

U.S.	200 plus about 40 on order
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LTV A7

U.S.	1000 inventory and on order
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3. U.S. (in development)

AX close-support turboprop fighter

U.S.	orders forthcoming
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4. Soviet Union (production ended)

Mikoyan MiG-15

China	1000
Czechoslovakia	unknown
Poland	unknown
Soviet Union	unknown
UAR	unknown
Albania	24-30
Algeria	20
Bulgaria	10
Cambodia	5
Cuba	60
E.Germany	100
Hungary	unknown
Indonesia	unknown

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Aircraft Type)

Mikoyan MiG-15 (cont.)

N.Korea	15
Nigeria	
Rumania	unknown
Somalia	10
Syria	unknown
N.Vietnam	60

Mikoyan MiG-17

China	500
Czechoslovakia	unknown
Poland	unknown
Soviet Union	unknown
UAR	unknown
Afghanistan	80-100
Algeria	30-35
Bulgaria	120
Cambodia	10
Cuba	100
E.Germany	260
Hungary	unknown
Indonesia	unknown
Iraq	unknown
N.Korea	375
Morocco	15
Nigeria	10-15
Rumania	unknown
Somalia	5
So.Yemen	10
Syria	unknown
Uganda	10
N.Vietnam	35
Yemen	10

Ilyushin Il-28

China	150-300
Czechoslovakia	30
Poland	80
Soviet Union	700-800

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Aircraft Type)

Ilyushin Il-28 (cont.)

UAR	30-40
Afghanistan	50
Algeria	20-30
Bulgaria	unknown
Finland	5
E.Germany	unknown
Indonesia	40
Iraq	10
N.Korea	70
Morocco	2
Nigeria	2-3
Pakistan	4
Rumania	unknown
Syria	5
No.Vietnam	5
Yemen	10

Yakovlev Yak-25

	Soviet Union	unknown
TU 16	China	10

5. Western Europe (production ended)

Gloster Meteor

Argentina	25
Brazil	0-10
Ecuador	10

BAC Canberra

Australia	35-40
India	50
So.Africa	10
UK	195
Ecuador	5
Ethiopia	5
New Zealand	10
Peru	5
Rhodesia	15
Venezuela	5

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Aircraft Type)

DeHavilland Vampire

Australia	24
India	30
So. Africa	50
U.K.	50
Austria	5
Burma	10
Chile	5
Dominican Republic	20
Finland	15
Jordan	15
Lebanon	5
New Zealand	15
Portugal	unknown
Rhodesia	15

Hawker Hunter

India	150-190
U.K.	265
Chile	20
Denmark	20-30
Iraq	50
Jordan	30
Kuwait	15
Lebanon	10
Peru	15
Rhodesia	10
Saudi Arabia	5
Singapore	20
Switzerland	90

Hawker Siddeley Gnat (production at low rate continuing in India)

India	200-250
U.K.	70
Finland	10

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Aircraft Type)

Hawker Siddeley Buccaneer		
U.K.		165
S. Africa		15
De Havilland Sea Vixen		
U.K.		150
De Havilland Venom		
Switzerland		215
Dassault Super Mystere		
France		110
Israel		15
Dassault Mystere IV		
France		160
India		60-110
Israel		35
Sud Vautour		
France		80
Israel		15
Dassault Etendard IV		
France		70-85
Dassault Ouragan		
India		50-100
Israel		45
SAAB Lansen		
Sweden		450
SAAB-29		
Austria		20-25

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Aircraft Type)

6. Western Europe (in production)

Hawker Siddeley Harrier

U.K. 71 on order

U.S. 12 on order

Fiat G.91Y

Italy 55 on order
and 20 optional

Fiat G.91

West Germany 22 on order

7. India (in production)

HAL HF-24

India orders outstanding

8. Argentina (in development)

DINFIA 1A.58

Argentina 80 on order

C. Subsonic Armed Trainers

1. U.S. (production ended)

Lockheed T-33

Canada 160

France 150

W.Germany 100

Netherlands 30

Yugoslavia 30

Brazil 50

Burma 10

Chile 5

Colombia unknown

Denmark 25

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Aircraft Type)

Lockheed T-33 (cont.)

Ecuador	unknown
Ethiopia	unknown
Greece	10
Japan	190
S. Korea	5
Mexico	15
Nicaragua	5
Pakistan	15
Saudi Arabia	10
Thailand	5

2. U.S. (in production)

Cessna A-37/T-37

Brazil	66
Burma	10 on order
Colombia	10 on order
Peru	25
U.S.	200
So. Vietnam	20 and 40 on order

3. Canada (in production)

Canadair CL-41

Canada	190
Malaysia	20

4. Western Europe (production ended)

Fiat G.91

W. Germany	335
Italy	275

Hispano HA-200

Spain	190
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Morane Saulnier Paris (licensed production in Argentina
may continue)

Argentina	45
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POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Aircraft Type)

5. Western Europe (in production)

BAC-167/Jet Provost

UK	300
Burma	40
Iraq	20
Kuwait	5
Muscat & Oman	12
Nigeria	1
Rhodesia	unknown
Saudi Arabia	25
Singapore	16
So. Yemen	8
Sudan	unknown number on order
Venezuela	15

Sud Magister

France	275
W. Germany	235
Israel	65
Austria	15
Belgium	45
Brazil	10 inventory and orders
Cambodia	5
Finland	80
Lebanon	5
Morocco	30
Uganda	5

SAAB-105 (SK60)

Austria	20 on order
Sweden	150

Macchi MB.326 (including licensed production)

Argentina	24
Australia	65 inventory and orders
Congo (K)	17 on order
Italy	100
So. Africa	300 inventory and orders
Tunisia	5
Ghana	5
Zambia	6 on order

POSSIBLE WORLD INVENTORY OF JET-POWERED COMBAT AIRCRAFT, END OF 1969

(continued)

(By Aircraft Type)

6. Western Europe (in development)

Hispano HA-220

Spain

orders forthcoming

7. Eastern Europe (in production)

(Czech) L-29 Delfin

2500 delivered and on order

UAR

unknown

Nigeria

10

Uganda

unknown

Bulgaria

unknown

Czechoslovakia

unknown

E. Germany

unknown

Hungary

unknown

Indonesia

unknown

Iraq

unknown

Syria

unknown

USSR

unknown

SOKO Galeb

Yugoslavia

unknown

OKL Iskra

Poland

unknown

8. Eastern Europe (in development)

L-39

orders unknown

SOKO Jastreb

orders unknown

9. India (in production)

HAL HJT-16

India

175-200